

# COMPUTER WORLD

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NEWSPAPER

### NEWS IN BRIEF

#### Sen. Hart to Keynote National Conference

NEW YORK — Sen. Philip A. Hart (D-Mich.) will be the keynote speaker at the National Computer Conference here Monday, June 4 at 10:30 a.m.

Hart is chairman of the Senate Committee on Antitrust and Monopoly, which is currently having hearings on his bill to break up concentrated industries (See story on Page 3).

Hart has also been active in issues on the environment, civil rights and liberties, and consumer protection. He is chairman of the Senate Subcommittee on Energy, Natural Resources and Environment.

#### Charges Dropped (Briefly)

#### Against Alleged Criminals

SAN ANTONIO, Texas — It was only a temporary problem, but computers took the blame when charges were "dropped" against some 35 alleged criminals here recently.

Omissions on 35 indictments, making them faulty and thus temporarily invalid, were blamed by local newspapers on "a computer error" and a "computer programming error," but the heart of the problem was a forms-handling error, according to a source in the District Attorney's office.

And the error involved a magnetic tape selective typewriter (MT/ST), a simple computer at best.

In preparing indictment forms for transcription onto the MT/ST, someone apparently cut off the bottom of the forms, and two lines were thus dropped, the source said.

#### Aussies Mull Dental ID Index

Special to Computerworld

SYDNEY, Australia — Dental authorities in this country may introduce computerized dental records to help police identify people. The records would be stored in a central computer bank and be used by police as an alternative to identification by fingerprints.

Presidents of all state dental boards will discuss the proposal at a meeting this month.

#### On the Inside This Week

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AT&T Says 30% Non-Bell  
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## IBMer Disclaims 'Task Forces' IBM Summons Users in Suit Defense

By E. Drake Lundell Jr.

Of the CW Staff

TULSA, Okla. — The first IBM employee to be called in defense of the firm in the Telex-IBM antitrust case said last week he had never heard of many of the task forces that Telex described in its presentation of its case.

Francis Rogers, now IBM director of marketing, said he did not know of the existence of such task forces as the Peripherals Task Force, even though he was a member of the IBM Data Processing Division at the time it was alleged to have been undertaken.

In addition, on cross examination he admitted he knew of no cost reductions in manufacturing or marketing that made it possible for IBM to reduce the prices for the 1403 printer. He said it had been in use for eight years before the action was announced and that the price cut under the fixed-term plan was made after Telex had introduced a competitive product.

In the opening rounds of its defense, IBM also called several users to the stand

to show that competition in the DP business was growing and to generally laud the IBM products and services offered.

For example, David Hill, information systems manager of the Chevrolet Division of General Motors, indicated there were 69 suppliers of EDP equipment at GM when he joined the company two years ago, but now there are 116 different equipment suppliers.

Frank Heinzmann, vice-president of computer services at Eastern Airlines said his organization uses products from 35 different suppliers at the present time and competition has been growing.

He also claimed that generally it is not hard to interface outside equipment to IBM systems, even though he admitted that in a few cases Eastern had had to develop interfaces itself for the equipment.

Eastern, he added, got excellent service from IBM and received very good equipment from the firm.

Neal Sullivan, DP director of Rockwell International, noted that his firm had some trouble with getting service for

Telex equipment it had installed and that it was taking out all of the Telex gear it was using. He rated Telex electronic equipment as good, but said the electro-mechanical gear such as printers was not as good.

#### IBM's Problems

In his testimony, Rogers also mentioned that IBM took a long time (18 months) to train its salesmen and claimed that after IBM salesmen had made a sale the independent peripheral makers took advantage of that groundwork in order to get their equipment installed.

The three guiding principles of IBM, he stated, were respect for the individual, an effort to give the customer the best equipment possible and a striving for excellence.

The IBM defense should continue into this week with IBM President Frank Cary scheduled as one of the last IBM witnesses after the IBM economists make their presentation.

## Defense Move A First for IBM

TULSA, Okla. — For the first time in the history of antitrust suits against IBM, the firm has been forced to present its defense in open court here in the \$1.2 billion antitrust suit by Telex.

In all the other antitrust actions against the firm, IBM has either settled out of court before a trial ever began or has managed to have the suit dismissed before the plaintiff presented its case and before IBM presented its evidence (the Greyhound suit).

In the present case IBM also asked the judge to dismiss the action against it after Telex had finished its presentation, but Judge Sherman Christensen overruled the request.

(Continued on Page 2)

## Equity Investor Suit Says IBM Safeguards Lacking

By Marvin Smalheiser

CW West Coast Bureau

LOS ANGELES — IBM Corp. has been accused of being partly responsible for the Equity Funding Corp. of America scandal in a Superior Court suit filed here.

The class action suit, filed by five Los Angeles residents, seeks over \$4 billion in damages.

The suit charges IBM contributed to the scandal by failing to build safeguards into its equipment. It also says IBM neglected to warn the users of the possibility of fraud.

The Equity Funding debacle involved the creation of \$120 million in bogus assets and the sale to reinsurers of possibly \$2 billion in phony life insurance policies.

Equity Funding officials have been accused of using computers to make up the phony life insurance policies to provide cash flow for the corporation's activities. The suit named IBM, its affiliates and subsidiaries which manufacture, sell, lease, rent, program, service, repair and operate the computer and data processing equipment as defendants. The suit was filed by attorney Alvin B. Green, who also filed the initial class action suit against Equity Funding for the same five persons representing stockholders, warrant holders, bond holders, mutual fund holders and life insurance policy holders.

A spokesman for Green's office said some sort of legislation may be proposed to prevent similar occurrences. He described the computer as "an instrumentality as dangerous as the Saturday Night special handgun."

Green said, "We're not for the equipment being manufactured as presently constituted and IBM's selling to aid the general public, the product, fraud would probably never have arisen."

Green also said he feels the suit will "serve as a warning to the computer industry that it had better take steps to ensure the public is not defrauded in this manner."

IBM, when it heard of the suit, said: "The claim is preposterous and could seriously mislead the public. No one should be misled into supposing that companies that supply equipment for legitimate business purposes can be held liable for allegedly fraudulent use of that equipment."

(Continued on Page 3)

## Navy Users Told

## 100% Security Unreachable

By Edward J. Bride

Of the CW Staff

NEWPORT, R.I. — "I don't think a system exists that can't be broken," said the head of the Navy's computer selection office recently.

"And I don't think we'll ever reach 100% security," added Cmdr. Jan Prokop, director of the ADP Equipment Selection Office (Adespo) in the Navy Department.

Occasionally, directors of large computer installations claim they have completely secure systems, Prokop continued, "then some student walks in with copies of their files."

Furthermore, many organizations are "past the point of no return" as far as computer security is concerned: they have no manual files for backup in case security is breached, he said.

Speaking before the fifth annual data processing seminar of a joint Navy user group here, he philosophized that "minimal security can be provided at minimal cost."

Since "we'll never reach a 100% secure installation," Prokop advised computer users to spend their money where it will do the most good in particular situations, such as physical access control and security



CW Photo by Edward J. Bride  
Cmdr. Jan Prokop

Related stories on pages 4 and 5.

ity clearances for personnel.

A guideline to assess the security characteristics of remote terminals is in the early stages, reported Dr. Ruth M. Davis, director of the Institute for Computer Sciences and Technology at the National Bureau of Standards (NBS).

While algorithms for data encryption are (Continued on Page 5)

# COMPUTERWORLD

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# IBM Dismissal Bid Hints at Strategy

By E. Drake Lundell Jr.

Or the CW staff

TULSA, Okla. — In making a move for a dismissal of the Telex charges against it, IBM may have telegraphed a strategy that could be used later when it asks the judge to find it not guilty of the charges.

In a memorandum supporting its request for dismissal, IBM lead attorney Thomas Barr said that "Telex is seeking to have this court define a relevant market in a fashion 'which is radically inconsistent' with the law and with previous cases."

## 'Unique Legal Precedent'

The memorandum argued that IBM felt Telex's basic argument is that IBM monopolized its own product line. "If Telex's theory is accorded any merit," Barr said, "the unique legal precedent will result in potential monopolization liability for most American businesses of any size — each might logically be held to have monopolized his own product line."

Barr also claimed "there is absolutely no support to Telex's novel theory of market incursion" in either earlier cases or the Sherman Antitrust Act itself.

In addition, he claimed that all other cases under the act the market had remained stable for a long period of time.

The most similar case in the past was the DuPont "cellophane" case, Barr said. In that case he noted DuPont was found

## N.Y. Court Rules Documents Public

NEW YORK — The full court of appeals here has turned down an IBM request that 1,200 documents it filed in the Control Data case be kept secret.

IBM claimed — when the documents were turned over to the Justice Department by Control Data for the government antitrust case — it had accidentally let the 1,200 documents be filed in the case even though they were privileged.

Because the documents had been turned over by accident, IBM was asked Judge Daniel Edestein, who is presiding over the government's case, to prevent the Justice Department from using the documents.

Edestein balked, however, and in pretrial order number five claimed IBM had waived its right to keep the documents secret when it turned them over to Control Data. Because of this, he

said, they were public documents and could be used by the Justice Department in its suit.

IBM appealed the decision, however, and an original panel of three judges in the appeals court upheld the IBM position claiming the documents should be kept secret.

The Justice Department, however, immediately appealed that decision to the full eight-member court of appeals. That group, in its decision last week, said it did not have jurisdiction over the matter and therefore upheld the Edestein decision that the documents should be public.

The court of appeals said if IBM wanted to pursue the matter it would have to go to the Supreme Court. IBM has not filed a request with the Supreme Court asking it to take up the issue of the privileged documents, but it has routinely reserved the right to do so in the future.

make all the motors for their own cars.

"Ridiculous as this analysis may appear," Barr said, "it is the necessary outcome of accepting Telex's position. Telex itself analogized the memory of a CPU with an engine in a car... yet Telex is claiming that IBM is monopolizing the market for CPU equipment when it is using IBM CPU central processing units."

"The Supreme Court in 'cellophane' disposed of such a radical theory of market definition. This court should do likewise."

## 'Slight Changes'

In addition, Barr said the Telex case also shows that equipment made by IBM equipment can be used with the mainframes of other manufacturers with only slight changes and that therefore it is not equipment made solely for the IBM market as Telex claims.

"Particularly where, as here, Telex has had ample opportunity to place before the court an enormous quantity of documents and many witnesses, this court should dismiss for Telex's failure to prove a market," under rule 41 (B) of the Federal Code, Barr said.

In conclusion, Barr said "the market theory advanced by Telex has no support in the law and is contradicted by the proof in its case... equally important, the proof concerning the way Telex markets its own EDP equipment and the proof showing how other market similar equipment, disproves any claim that a 'market' exists for that equipment when attached to IBM CPUs."

"For these reasons, Telex's antitrust claim should be dismissed," Barr concluded.

not guilty.

People in Glass...

He also claimed that if the court accepted the Telex definition of the market, then General Motors, Ford and the other car makers would have to be found guilty of monopoly practices since they

peripherals segment of the industry. Daniel Jersbak, a general partner in Price Waterhouse, the accounting firm which audited the census data, indicated that the census figures show that in 1952 there were only 13 firms in the business and that by 1970 this had grown to 1,773 companies.

IBM's share of the gross revenues in the business was 64.1% in 1952, he said, but he claimed that by 1970 this share had dropped to 35.1% of the gross revenues from data processing.

However, he admitted on cross examination that his firm had never tried to break out the revenues for peripheral products alone or for any other single segment of the market.

In the period from 1952 to 1970 he said that revenues from DP sales and leases had risen 212 times from \$48 million yearly to over \$10.2 billion in 1970.

In another area, he said the figures showed that of the revenues reported by hardware manufacturing companies reporting revenues of over \$5 million the IBM share had also declined. In this category, he said the firm had a 67.7% share in 1952 and only a 44.9% share in 1970.

## Is IBM Market Share Declining?

TULSA, Okla. — Using data from the census of companies in the computer industry compiled in the IBM-Control Data antitrust action, an IBM witness last week indicated that IBM's share of the market was actually declining and that competition was growing.

Earlier in the case, a Telex economist had used the same data in a presentation that indicated IBM controlled the lion's share of the business in the independent

## A First: IBM Gives Defense

(Continued from Page 1)

The judge noted that dismissal of cases could be the correct course of action in some antitrust cases, but said this particular one was too complex to be dismissed before he had heard all the evidence.

He also noted that IBM had specifically requested that its counterclaim against Telex for theft of trade secrets be heard with the Telex case against IBM and indicated he had not yet heard any evidence on this matter.

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## Passive Entry 'Good Way' To Obtain Sensitive Data

NEWPORT, R.I. — Passive intrusion into an operating system is a "good method" for a criminal to obtain sensitive or otherwise valuable information, according to Cmdr. Jan Prokop, director of the Navy's computer selection office.

The three main methods defined by Prokop at a Navy seminar as "passive intrusion" include electromagnetic pickup (by radiation of signals), wiretapping and hidden transmitters.

To allay any suspicion that he was suggesting only possible, rather than actual methods of intruding into a computer, Prokop gave specific examples of two of these methods.

Regarding radiation from a computer, he said he had supervised a programmer who had a transistor radio in a working space several floors away from the main computer. Nobody knew why the programmer was always first to ask for test-time when the system was idle, until it became known that the programmer could tell, by the static on the radio, when the printer stopped.

Prokop claimed it would be a simple matter to decode the static and obtain copies of whatever messages were being printed. He also suggested this method of eavesdropping was effective for CPUs, other peripherals and communications lines.

He also cited a test case in the Pentagon where a CRT was being read by radiation signals by an unauthorized user several rooms away from the computer.

Prokop also claimed "hidden wireless transmitters had been found inside a CPU at a security agency. These could transmit information to a truck with electronic receiving equipment," he noted.

## Modeling Know-How Can Aid Management

NEWPORT, R.I. — "We know enough about modeling to aid in management," although computer hardware currently may be inadequate, according to Harvey J. McMains, director of corporate planning at AT&T.

One prime use of models would be depreciation, whereas a computer model can provide management with a better, deeper understanding of this financial reality, McMains noted.

Another area is "our pool of funds," he said. Financial modeling in this area can be likened to the "theory of dams," McMains said, adding cash flows into a "reservoir." In the case of AT&T, the outflow is \$200 million a day, he added. Optimizing I/O is incompatible with modeling, which is "multidimensional," he stated.

McMains told attendees at a Navy computer user-group seminar here that "present management is not equipped to deal with machine modeling," which is really performed for "strategic support."

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## No Installation '100% Secure'

(Continued from Page 1)  
now being sought, she said, a guideline "in the next calendar year would be a major breakthrough."

She agreed with Prokop that a major problem facing users today is an "increased" capacity for computer crime, "particularly since there is also an increasing demand for real-time processing in the public services sector of computer usage." "This is a service economy," she remarked, acknowledging an increasing public demand for accountability in this service environment.

### Protecting Operating Systems

Another "big issue left" is that of securing operating systems. Prokop examined two routine manners of "active intrusion" into a system, and three specific areas where operating systems can be breached by "sophisticated" approaches. "Browsing" and "masquerading" represent the least sophisticated approaches, he noted. The first occurs when a user accidentally discovers another user's password, while the second is an intentional unauthorized access with an illegal password.

Prokop described three other methods:  
• "Using trap doors," little places in the operating system where "cracks appear in the cement," such as uncleaned NO-OP instructions.

• "Between-the-lines entry" in a communications environment. This occurs, Prokop said, when one user gets on the system, and the second user (the perpetrator) awaits the opening of files, then transfers the files of the rightful owner to a disk or other storage. The computer, Prokop claimed, "can't tell" the difference between the two users. After storage, the files are printed when the first user has a sign-off.

• "Piggy-back entry." This is accomplished by actually cutting the communication lines and connecting a minicomputer between the rightful user and the computer. When the authorized user calls the computer, the minicomputer answers, while the perpetrator uses the mini to relay his own messages to the computer system.

The mini, in effect, is distracting the authorized user, possibly to the extent that he gets frustrated and "signs off," never realizing a "conversational rapport" is still going on between the perpetrator and the computer, Prokop said.

## You've Come a Long Way

NEWPORT, R.I. — Operating systems have come a long way, according to Prof. John Donovan of MIT. At a Navy seminar he cited some specific examples of recent progress in operating systems:

- OS/360 took 2,000 man-years to build.
- TSS took 500 man-years.
- Multics took 50 man-years.

While IBM's TSS was developed in assembly language, Donovan said, Multics, developed at MIT, represents the "operating system of the future," in that it was developed in a high-level language.

Donovan also recalled that a graduate student was assigned to write an operating system similar to IBM's OS/MVT/360, and it took the student one-and-a-half months to complete the task.

"This is in the advance level of understanding" which has taken place, he related. Donovan also predicted that the high-level language for operating systems would not be Cobol.

"We now know users are demanding different classes of storage," he said, as well as other conditions that exist in such languages as Algol/68 or PL/I.

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## Bill Seeks to Control Texas' DP Acquisitions

AUSTIN, Texas — A bill that would tighten controls over the purchase and rental of data processing equipment by state agencies has been submitted to the State Senate here and approved for floor debate.

The bill would require approval by the governor's office and the state auditor for the purchase or lease of computers and related equipment by state agencies.

Sen. William N. Patman, sponsor of the bill, said the costs of DP equipment purchased by the state have skyrocketed from \$1.5 million in 1964 to \$8.3 million in 1973. In addition, the state owns over \$20 million worth of DP equipment.

"Presently there is no general statute that governs specifically the procedures involved in the acquisition of computers and computer-related equipment and services by state-supported agencies and institutions," Patman said.

### Educom to Study Trends in Centralized Computing

PRINCETON, N.J. — The Exxon Education Foundation has awarded \$66,000 to the Interuniversity Communications Council, Inc. (Educom) to study the ways in which state agencies have centralized computing services for institutions of higher education and the extent of the trend toward centralization.

"This project will encourage the sharing of information among state agencies and will provide an evaluation of the impact of statewide consolidation and networking on the future of computing in higher education and on the relationship between educational and governmental agencies," said Henry Chauncey, president of Educom.

The study will begin with a survey of developments in all the states to identify the most significant developments. Representatives of the most promising systems will then be brought together to exchange views in a working conference scheduled for the fall of 1973. Results of the study will be published in a report to be distributed.

tributed to educational institutions and governmental agencies.

### Grading System 'Fails' But Only Temporarily

CENTRALIA, Wash. — An otherwise smoothly running computerized school grading system was recently held up for

Norwood opened it he discovered the grades for department were in the academic achievement column, the effort grades were in the department column and the achievement grades were in the effort column.

Another set was ordered and two days later it arrived along with the first set which had been returned by The Dalles.

### DP Decides Summer Jobs

LOUISVILLE, Ky. — How would you like to have a computer decide whether or not you got the job? That's what's happening to 840 sons and daughters of General Electric employees here.

GE's employment office put the names of the summer job applicants into a computer and had it pick them out one by one in random order.

Is it fair? This year's number one choice was 902 on the list last year and didn't get on at GE. And this year's number 840, last on the list, was number 165 a year ago and got a GE job.

### Legislator Finds 'May' Most Distressing

MADISON, Wis. — "May Day" has never been a more appropriate distress signal than in the case of State Rep. Edward Jackamonis.

Jackamonis has asked the Legislative Reference Bureau to draft a bill altering the state's spring election laws, which would entail the use of the month name May.

Wisconsin has a system under which computers scan the statute books to locate designated words and phrases, ensuring that all sections affected by a new law will be changed.

The computer dutifully scanned the books, but, unfortunately for Jackamonis, did not discriminate between the proper noun May and the verb may. The result was a voluminous printout listing 22,721 references to "M(m)ay," but with no indication as to whether it was an "m" or an "M."

## News Wrapup

two weeks due to a bus company error.

Computer printouts of the student grade reports for W.F. West High School were mistakenly shipped to The Dalles School in Oregon when students at The Dalles were on spring vacation, according to Larry Norwood, principal of W.F. West.

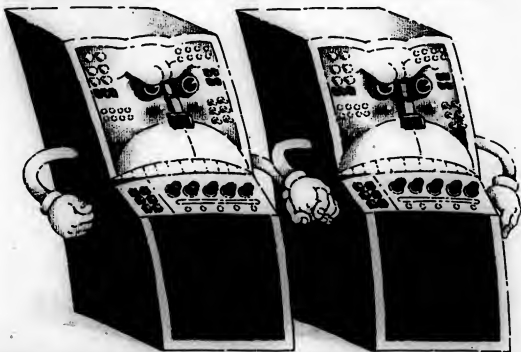
While the reports sat in an Oregon bus depot waiting for school to resume at The Dalles, Norwood ordered another set of grades from Computer Systems, Inc. The second set arrived quickly but when

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## Five-Year Study Finds

# Simple Signal Control Enough to Keep Traffic Moving

By Joseph Hanlon

Special to Computerworld

GLASGOW, Scotland—Controlling traffic signals with complex software and large computers is a mistake. Small computers and simple software do at least as well, and often better.

This surprising conclusion comes from five years of research by the Transport and Road Research Laboratory (TRRL) here comparing different forms of signal control.

The simplest computer control, with the same signal timings every day, moves traffic faster than complex "demand responsive" systems that change timings in response to actual traffic. The reason, TRRL said, is that a predetermined set of timings can be optimized for an entire network of signals, while a demand responsive system optimizes each intersection separately. In the latter type of system, time gained at one intersection

can be lost at the next.

In any computer-controlled signal system, all of the traffic signals are connected to a central computer, which tells the signals when to change. The question is how the computer decides when signals should change, TRRL explained.

In the simplest form, the computer uses the same set of instructions every day. This schedule is stored in memory, and a digital computer is required for only two purposes: keeping track of timings and monitoring traffic signals to see that they function correctly.

### Five Timings

The schedule of timings, however, is determined by the use of a large computer model which takes into account the normal traffic flows at each intersection. Usually there are five basic timings: morning peak, mid-day, afternoon peak, evening and night.

Using TRRL's Transyt to set the timings, this relatively simple form of computerized signaling cut average journey time here by 16% and in West London by 9%, the research group said.

### Consider Variations

Such a system, however, assumes that traffic is approximately the same every day, and does not take into account random variations in traffic during the day. By installing traffic sensing devices at each intersection and using a large central computer, it is possible to change the timings to suit the traffic.

TRRL tested this "demand responsive" technique, which uses a basic predetermined timetable and modifies it somewhat to suit traffic. Surprisingly, it produced no additional benefit despite the extra cost, according to J.A. Hillier, TRRL head of traffic engineering.

Next TRRL tried "a complex, fully

responsive control strategy known as Pilot," Hillier said. It increased journey time by 29% and "brought the traffic in parts of central Glasgow to a complete standstill."

The Glasgow experience is supported by tests elsewhere. In Madrid, for example, a Transyt-optimized fixed-time system decreased average journey time by 9% over a demand response system already in use, the laboratory said.

### Big Computers Unnecessary

Traffic experts here argue that big computers are unnecessary for signal systems. They believe a DEC PDP-11 or a small, process control computer such as a Honeywell 316 is adequate.

In Glasgow, for example, TRRL installed a large Marconi Myriad I because it planned a wide variety of tests. Now this city finds it can control signals at 80 intersections with only 5% of the machine's time, the researchers said.

There seem to be two reasons why the simpler systems work best. As one expert commented: "An adaptable system like Madrid's ties itself in knots trying to keep up with the traffic, while a fixed time plan fits the traffic to the signals but gets it through faster."

The second factor is that traffic is surprisingly predictable and consistent. Even bad weather or an early closing day does little to change city-center traffic, so that the data used to optimize the fixed time system is almost always correct, traffic experts said.

Hillier also stressed that low-level computerization is highly profitable. The Glasgow system cost \$850,000 to install, yet the journey time saved is calculated to be worth \$1.2 million each year.

## Computers Take The Bite Out of Dental Implants

LOS ANGELES—Computer techniques to improve the design of dental implants as replacements for missing teeth are being developed through a cooperative research program of the University of Southern California's School of Dentistry and Caltech's Jet Propulsion Laboratory, Pasadena.

Preliminary computer models have been developed for evaluating the function of dental implants under normal chewing action. These models will allow researchers to study the stresses and strains set up in each tooth—or its implant replacement—and the jawbone, and to investigate different kinds of implant materials.

The goal of the joint project is to design implants that function as efficiently and safely as natural teeth.

batch processing machine. We have formally designated this service as TS/RJE. Informally, we call it "Scrooge-2," for the way it carefully squeezes every dime you give it.

In Scrooge, the most comprehensive operating system, OS, can be automatically used for execution of batch programs that were developed under the language-compatible CP/CMS time-sharing system.

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In addition, there is provision for information flow back and forth between machines, to and from batch terminals as well as interactive types. You can query status and/or cancel batch work. A powerful skeleton processor minimizes the OS job deck that must be stored in an on-line file.

We can plug you into Scrooge right away, but you'll probably want some details first. Call or write Curt DeForest, Manager-Computer Services, Grumman Data Systems, Department 260, Bethpage, New York 11714.

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- (3) You can hook up your own batch-processing 360 to our time-sharing 360/67. You'll get time-sharing response on these priority development jobs, while maintaining a cost-effective operational level.
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## Computer Week III: 'Working Together'

BUFFALO, N.Y. - "Working together to promote better understanding of data processing within our community" is the theme of Computer Week III, a five-day program of DP-oriented activities sponsored by a group of professional organizations here.

The events, planned for May

21-25 at the Hotel Statler, will be open free of charge to computer professionals, users and the general public. About 25 to 30 vendors will be exhibiting and there will be some special displays for non-DPs to help them become acquainted with computers and data processing. There will be educational semi-

nars throughout the week on topics which include minicomputer applications, educational uses of computers, systems design, privacy and security and program language selection.

One of the sponsors of the

## Societies/User Groups

show is a group of local high school students - the Student Cybernetic Laboratory (Scyl) - which will be demonstrating the use of on-line terminals.

The other sponsors of the program, besides Scyl, are the local chapters of the Data Processing Management Association (DPMA), Association for Systems Management (ASM), Association for Computing Machinery (ACM) and The Institute of Management Sciences (Tims).

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## Information Technology Institute To Explore Management Problems

WASHINGTON, D.C. - An Institute of Information Technology and Management will be held May 22-24 at the American University to explore major problems and opportunities for managers in the use of information technology.

Among the questions to be discussed will be: "How is information technology affecting information systems?"; "How can information systems managers plan for and accommodate major changes in technology?"; and "Impact of information technology on political-legislative processes - implications for

management?"

A one-day workshop on design of management information systems will precede the institute on May 21.

Registration for the institute is \$250 and \$75 for the workshop. Further information is available from Lowell H. Hattery, Director of the Institute on Information Technology and Management, Ward Circle Building, The American University, 20016.

## ASM Seminar Features 8 Tracks

BOSTON - The thirteenth annual New England Systems Seminar, sponsored by the Bay State, Boston and Mayflower Chapters of the Association for Systems Management (ASM), will be held June 8 at Bentley College in Waltham, Mass.

The program is divided into eight tracks with individual sessions ranging from single lectures to all-day in-depth studies. Some of the tracks include "Input/Output," which will cover man-machine interface and systems design for COM; "Technical Applications," dealing with

minicomputer networks in retailing, and "Terminal-Oriented Systems," which will look at hardware and software components, and design, conversion and installation considerations.

Commander Grace Murray Hopper will conduct a session on "Futures in Hardware and Software."

Registration for the seminar is \$40. Further information is available from Arnold Canner, Registration Chairman, NESS, c/o New England Nuclear Corp., 575 Albany St., Boston, Mass. 02118.

## AIIE 25th Anniversary Conference Planned

CHICAGO - The American Institute of Industrial Engineers will be focusing on "NOW: New and Old Ways of solving problems" at their 25th Anniversary Conference, May 23-25 at the Conrad Hilton Hotel here.

For further information contact Technical Services, AIIE, 25 Technology Park/Atlanta, Norcross, Ga., 30071.

# Next time a high-speed drive ruins that bargain tape you bought, here's a note for your wife:



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## Computer Keeps Watch Over Governor's Mail

By Ken Shonk  
of the CW staff

COLUMBUS, Ohio — A computer watchdog has taken over the job of making sure that the appropriate person on the governor's staff or the appropriate state official sends a reply to over 2,000 letters a week Governor John J. Gilligan receives.

The watchdog system has made real progress in the two months of its existence in reaching the Governor's avowed goal of a more responsive government, Gilligan's press secretary, Robert Tenebaum, said. The amount of mail coming into the governor's office since the system became operational has tripled.

"When we were automating the mail handling system," said J. Tepper, Gilligan's executive assistant for administration, "we set up a system of routing codes for recording the subject matter, the opinions expressed, the origin, the official the letter was referred to, the writer and other information for each letter."

The coded information is then input to become part of the system's data base. When letters are answered, forms are returned to notify the computer. When letters aren't answered the computer sends a reminder to the official the letter was sent to for reply.

The system also has the ability to generate weekly status reports for the governor and to make management reports which break down the governor's mail according to any of a number of

classifications such as area, city, county, issues or opinions expressed.

"For instance," Tepper said, "the system could generate mailing labels for all the people who had ever expressed any opinion on environmental issues in the event the governor makes a policy statement on the issue or submits a bill to the legislature."

Tepper also stated the system is a timesaver when compared to the old manual system of mail handling. "The paperwork is actually less, and it's no problem for our large DP center to handle," he said.

### N.Y. Weighs Welfare Bill

ALBANY, N.Y. — Governor Nelson Rockefeller recently submitted legislation to have the state take over the administration of welfare and Medicaid programs now under local jurisdiction.

Rockefeller said state administration of these programs "would provide greater opportunity for systems applications, including computerized cross-checks, eligibility determinations and benefit calculations."

He said these functions would help reduce errors and would be necessary to meet stricter federal performance standards that will soon take effect.

The Department of Social Services, in anticipation of the bill's passage, has already retained three companies to develop the state system — IBM, Electronic Data Systems Corp. and Touche Ross & Co.

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Circle 24 on Reader Service Card, ENR 11/1/73

Sorry, but I'm afraid I won't be able to take you and the kids to the lake this weekend. That bargain tape Jack bought got ripped to shreds, and we'll have to spend hours re-running the program. I told him I'd rather pay the extra for Epoch & out of my own pocket, just to have my weekends back. Try to understand, Love, Fred

## Editorials

### 'Harmful' Statistics?

AT&T has purposely attempted to prove that customer-provided data equipment is harmful to its telephone network. (see related story on page 19).

By finally responding to repeated FCC requests, Bell has come up with some extremely questionable statistics, implying that 30% of all non-Bell equipment causes harm to the network.

But the phone company has provided little conclusive evidence to support its claims. Instead it has relied on an unidentified description of a "typical" computer user, and unidentified photos of independent equipment that might cause harm because of supposedly bad wiring.

But users know the interconnection of non-Bell equipment often provides better performance at lower cost. And neither these users nor their independent equipment suppliers are out to harm the phone network.

AT&T should not be allowed to condemn customer-provided equipment with unsubstantiated claims. No doubt there will always be isolated cases to support any argument. But the FCC should demand that AT&T provide statistically significant data to prove the serious charges it has made.

### Who's the Protector?

It is so hard for the public to understand that computers are only tools that at best can only be used to process data at great speed under the direction of human beings?

The suit filed in Los Angeles Superior Court by five investors of Equity Funding alleges that IBM must be the protector of the people. If we carry this uninformed and misguided logic to its just end, the next suit would be initiated against Bic International because someone used Bic pens to write up a list of fake insurance accounts.

The problem at Equity Funding, and indeed with most of the so-called computer frauds, is extremely simple. Auditors, in the traditional sense of the word, have been outpaced in their knowledge of accounting tools, what they can do and how they can be manipulated by almost anyone in a firm once people realize the auditors are no longer familiar with the tools of their trade.

In many business environments, it is impossible for the DP professional to realize his equipment is being used for an illegal purpose. We must all depend on the auditors.

And auditors, not manufacturer and DP professionals, must take the responsibility for protecting the people.

### Heads in the Sand

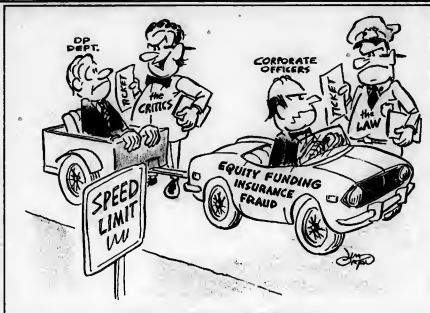
It is time election officials took their heads out of the sand regarding the security and accuracy of punched card and software-based ballot counting techniques.

In a recent survey of county election officers, an incredible 100% rated the security and accuracy of their systems as "good," indicating those topics were not high on their list of worries.

Perhaps it is lack of sophistication regarding the real dangers inherent in such systems on the part of these officials, or perhaps it is just that they have too easily accepted the claims made by the manufacturers of the systems, but it is clear that the systems may not be as accurate or secure as most officials think.

All election officials should take a closer look at their computer-based systems — a close look in which they will not be overawed by technical mumbo jumbo — to determine if they are really secure.

In cases where they clearly are not, the systems should not be used until ways can be found to ensure that they will be accurate and secure.



'Because You're a Passenger, That's Why'

## Letters to the Editor

### A Word of Gratitude For Hearty Response

I would like to express my sincere appreciation to the many contributors to *Computerworld* in response to the editorial regarding my letter in the March 21 issue.

The many responses give me some encouragement that the question of an apostrophe or other similar figures in a name is interesting and of concern to many. I shall follow this issue closely and hope that many others will also.

I believe every response deserves my personal thanks and am taking this means of expressing my thanks to each and every one.

Robert M. D'Unger  
Arlington, Mass.

### And Still More Ideas: It's a Spelling Error

I have followed with interest the commentary and exchange regarding Robert D'Unger's complaints that he cannot get his name spelled correctly on computerized printouts.

There have been a number of fancy excuses why it can't be done. The fact is that it can be done; it is just that provisions were not made in advance to do it. It will cost money to change programs and/or upgrade equipment, but much of the correspondence avoids this point.

The real issue is that to spell D'Unger's name without an apostrophe is a spelling error.

An apostrophe, like all recent marks, indicates that something has been left out. It cannot be dropped. To do so changes the word.

For example, the words *round* and *round* are pronounced the same. But the apostrophe makes them completely different words. Indeed, the words won't and won't are not only different words, but in this case, the apostrophe changes the pronunciation.

I defy anyone to tell me that dropping the apostrophe from a word will not change its mean-

ing. And no programmer has the right to change the information he or she is given before passing it along to the computer.

Margaret Dickinson  
Brighton, Mass.

### CDP Registrations May Be 30% Higher

In a recent article "ASM Explains Why It Left Foundation," [CW, March 28] it was reported that first-time registrations for the Certificate in Data Processing program had dropped from 2,233 in 1970 to around 1,430 this year.

The accurate figure for 1971 first-time registrations is 2,011, some 30% higher than the figure reported in *Computerworld*.

Your figures were obviously taken from an internal DPMA report prepared earlier in the year and was an early estimate.

Donn W. Sanford  
Executive Director

DPMA  
Park Ridge, Ill.

The 1,430 figure came from public documents issued in January 1973, not from internal ones. The use of the 2,011 figure in computing sales trends of the CDP (as was the context of the article) has certain technical problems, such as the admission in 1973 of CDP candidates without the same experience and the use of a 13-month year. Ed.

### CDP Shares DPMA Cost

In the article "Foundation Societies Urged to Pay DPMA \$2,500 Each for CDP Exam" [CW, April 4], it was stated that "during the 1969-1972 period, the losses from administering the CDP examination amounted to \$40,000." This is somewhat misleading although technically correct.

DPMA would have incurred most, if not all, of these costs even without the CDP program. Included in this figure, for example, is a prorated share of DPMA headquarters' utilities, taxes and salary allocations.

Donn W. Sanford  
Executive Director  
DPMA  
Park Ridge, Ill.

### Officially Speaking...

I was quite amazed to read "ASM Explained Why It Left Foundation" in the March 28 issue of *Computerworld*. Amazed, first, because this seemingly official ASM statement had a date-line of Chicago (not Cleveland), and second, that the contents were incomplete and out-of-context statements that were contained in a confidential and personal response to one of our members.

I would think we would both be better served if statements concerning ASM were complete, meaningful and truly official. That can be very easily accomplished by addressing inquiries to our executive director, Richard Irwin, at our international headquarters in Cleveland, Ohio. We will do our best to respond and we'll guarantee the authenticity of the responses.

While we believe our research and recent history have led us to the correct decision involving the Computer Foundation, the main point is that jointly we can better help ourselves to serve the systems profession by a more direct and official reporting of ASM's positions.

Harry Ritson  
International President  
Association for Systems  
Management  
Cleveland, Ohio

It is difficult for *Computerworld* to disregard documents passed on to us especially when, as in this case, "confidential and personal response" was contained in a letter sent to three people from President Ritson himself on association letterhead. Ed.

### Moving 'Grand Rapids'

Re: "Time and Motion Studies Get Moving" [CW, April 25], ACTS Computing Corp. is in Grand Rapids, Mich., not in Grand Rapids, Iowa.

Philip L. Glazier  
Vice-President  
ACTS Computing Corp.

Southfield, Mich.  
(Other letters and viewpoints on Pages 11, 12, 13 & 14.)

## Before Real Crisis Develops

## DPSers Must Design Set of Professional Practices

Any profession, including data processing, generally finds out its true technical needs in a time of crisis. The court system, with its elaborate built-in safeguards for judge and prisoner alike, was not designed when everybody thought the judge and prisoner could always be trusted.

It was designed so the system would work reasonably well even though judges can't always be trusted.

And the principles and procedures involved in protecting everyone against dishonest judges now form a key part of the judicial system.

The medical profession also had its crisis and had to learn to live with it. The doctors' crisis came when people they treated died, particularly when the doctor was suddenly. When the doctor was trusted, this did not matter. But when the doctor inherited wealth as the result of the patient's death, a whole professional ethic was created to allow the system to identify whether or not the doctor had in fact murdered the patient.

From this professional crisis we get the procedures of death certificates, the impropriety of treating one's own family, and other parts of the now-traditional professional method of

practicing medicine. And it was designed — as the judicial system was designed — to be effective when the professional concerned was not trusted, rather than when he was trusted.

Both these systems were designed using the special technical knowledge and appreciation that only the particular professional can provide. Only a person knowledgeable in law could design the appeal procedures intrinsic in judicial practice.

Only a person knowledgeable in medicine could realize that the practice of not prescribing for your own family where life is threatened, is the only one which could prevent some unlucky doctor from being tried for murder.

In both cases, at the time of crisis when the profession was not trusted — just as data processing is currently not trusted — the professionals turned to their own specialized knowledge to design a system which would be workable even though distrust (and even professional dishonesty) remained. It takes a while to catch a thief, and it is simply no good waiting until an untrained society tells a profession what to do.

## No DP Crisis, Yet

Currently, the profession of data processing can hardly be said to be in a serious crisis. I know the *Wall Street Journal* is continuing its apparent campaign against DP. I know the credit bureaus and credit cards still make life miserable for data processing people who care

about their profession and who cannot answer the questions put to them by ordinary citizens.

But I still cannot believe that this is very serious, and instead regard it all as a forerunner of the coming real crisis.

These minor crises are showing the way people will react when the real data processing scandal breaks. Equity Funding Life Insurance is not a real data processing scandal. The fraud there was organized by non-data processing people, and carried on through non-data processing means for years. It could have been caught in 1970 and 1971 by the auditors, or by the insurance investigators. I don't think it could have been caught until 1972 at the earliest by any data processing people.

The real crisis will come when a really sophisticated data processing scandal breaks, a scandal that can only be caught by data processors, because it is being handled by real data processing expertise (not just by the use of ordinary job control cards).

There have already been cases which came near to being this scandal, but as yet none of them has been big enough, or touched the necessary sensitive points of the public consciousness.

So we have time to prepare. We have time to design the ethical manner of practicing data processing so that data processing crooks get caught by data processors, and so time to save the honor of the profession itself.

In our preparations, we should consider those inessential items which make it possible for data processing to be "fixed." For instance, the practice of compiling an operational program, and then using the object-code version in the library, is clearly as open to abuse as leaving unstoppered, half-finished bottles of medicine in a doctor's consulting room. We should stop this dangerous habit.

The overhead involved in recompiling the programs in a load-and-go manner, is less than the overhead involved in throwing out thousands of "perfectly good pills which have been exposed to the possible contamination."

Just like the need for unquestionably good pills, the need for unquestionably accurate data is important. Therefore the practice of keeping libraries of operationally sensitive programs should be eliminated. The advantages are just not worth the risk. We should also look to our recordkeeping and record-

animation practices. Is the file that was received this week the same length as the file that was produced last week? Are the control figures controlling the whole of the data or only part of it?

We must look at the facilities that we provide the auditing profession — and look at its knowledge of them. It is standard auditing practice to make contact with knowledgeable people inside and outside the installation.

If, as appears to be the case in Equity Funding, they fail to make contact with data processing people, is this not a matter subject to an official objection to the audit?

There are other practices which also should be eliminated, but these will be dealt with later. For now, it is time to create the special body of knowledge that will turn us into a real profession. And, for that realization, we must accept the Equity Funding case as a blessing in disguise.

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**The Taylor Report**  
By  
Alan Taylor, CDP

## Letters to the Editor

## DP Makes Fraud Harder to Commit

The recent stories about the Equity Funding scandal demonstrate the difficulty the media has in accurately reporting events in which computers are involved. The consensus seems to be that someone helped an electronic superbrain carry out a complicated fraud.

Actually, that abused computer made it harder for anyone to commit fraud and easier for someone to detect fraud.

One vital element in certain kinds of embezzlements (insurance, bank loans, installment purchases, etc.) is to alter key programs to have them bypass certain accounts. There are programs available which can spot any differences between a program which has been certified accurate (and is kept under auditor's seal) and the supposed duplicate of it which is running in the computer.

This one check would have stopped the Equity fraud very early in the game. Accounts can be randomly selected by a program and sent through a normal cycle of activity in the computer.

The billing, collection and cancellation printouts can then be compared against predetermined results.

And finally, a program can examine the entire master file (impossible manually in most cases) and calculate the amount

that should have been billed over a period of time. Martin Burack  
New York, N.Y.

## Can Programmer Make Ethical Judgments?

Three rowing cheers for exposing the Equity Funding "DP Fraud" [CW, April 25] for what it was — a people fraud. And a chorus of boos for *Newsweek*, most of the financial press including *The Wall Street Journal*, Equity's "auditing" firm, the California Insurance Commission and the Illinois Insurance Department.

The insurance business, like almost any other business, has become increasingly complex and competitive. So complex some instances, that the EDP analyst or programmer can no longer be expected to pass judgment on the ethics of a marketing study, a modeling project or even some financial reports.

Just as a programmer can hardly judge the adequacy of an engineering formula for structural bridge design, he cannot be expected to evaluate actuarial formulae or the treasurer's report.

The programmer does his job as outlined in project specifications. And if he is a professional, he does that job to the best of his ability.

Ron Stewart

Manager  
Systems and Programming Dept.  
United Insurance Co.  
Chicago, Ill.

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# Generalized Data Base Packages Not Worth Cost/Risk

By Tom Gilb

Special to Computerworld

I challenge IBM or give well-founded total arguments for the use of generalized data base software (like GIS, IMS, VANDL, DBOMP, CODASYL, DBTO). I have never seen nor heard of any convincing total cost/risk argument for a generalized data base package as opposed to a simple self-developed package based on either standard Cobol/Fortran accessible access methods or assembly language coded subroutines, well insulated from calling high level application programmers.

Specifically, the suppliers do not know enough about the following factors in absolute terms, and they know even less about these factors in competitive terms (primarily as opposed to a do-it-yourself approach).

- **Portability:** To what degree is this software and the associated application programs movable to specified new environments such as future new association with other generalized packages (CICS, DOS/VS, VSAM); new secondary storage devices from same manufacturer (solid state); other suppliers' equipment and software?

In general it seems that the portability (cost of conversion) is very low compared to alternative techniques.

- **Implementability:** What does it really cost to evaluate, plan for, learn and program for such a system as compared to other systems? I challenge that assumption as never proven by comparative test.

In fact, it goes strongly against my own experience of building specific data bases based on standard high-level languages, as compared to the lengthy efforts of others to implement "ready made" packages.

- **Maintainability:** What is the cost of maintaining all aspects of this software as opposed to other methods? What is the cost of not being able to maintain major logical portions yourself? Some of these systems are as complex and demanding as any operating system and should thus require a system programmer staff.

- **Operational cost:** What do we know

about the additional operational cost as a direct or indirect result of making use of such a package. Not only present costs must be considered, but user control over future costs must be considered.

How much more processing time, core storage, etc. is necessary because a generalized package is used (as opposed to a tailored package).

- **Software Reliability:** Large generalized software systems tend to have an

## Viewpoint

uncontrollable quantity of bugs. Nobody, certainly not IBM, claims he even knows the theory behind software bug control. IBM's OS is completely out of control, it seems.

About seven years after initial delivery the bug rate has grown from 1,000 distinct new bugs reported per release in 1968 to over 11,000 new bugs reported

per release, according to counts in IBM's own bug report indexes in 1972.

Some of the most problematic bugs are reported to have occurred in the "simple" data base management method Isam.

What is the real price of these bugs for the generalized data base user? He doesn't have the documentation or the competence to analyze such bugs and repair them in a reasonable time

- **Supportability:** Which guarantees will IBM give for any given package that they will give full support for that package for a given number of years? Full support means that it will interface with all major developments in the hardware and software sector in this period so that the user will not be forced to abandon it in order to make use of new announcements.

- **Data security and reliability:** File security (access controlled via passwords) is if anything overdone for most users in the present packages. A far more serious problem is accidental destruction of data and records within a large and complex

data base.

I believe that the tools in the present software implementations are grossly inadequate to detect and automatically correct most of the random errors caused by hardware failure, software failure, application program bugs and human error. Most systems have some recovery/security features, but I believe that these are too general and too costly compared to some alternative techniques.

This is not necessarily IBM's fault but it does not provide sufficiently detailed design technique literature as a supplement to the generalized systems so that the user can carry out his "user responsibilities" (as defined by IBM in the data base package manuals) adequately.

The result is that many users will carry out their end of the reliability design of the data base inadequately, while hoping and believing that IBM has done this for them.

Tom Gilb is a consultant in Oslo, Norway.

## Small Size. Low Cost. It's the NCR



## Letters the Editor

### Special DP Task Force Unrelated to Doctors Group

Re: "Medical Record Problems Probed" in the April 25 issue.

Washington state doctors may have started investigating problems of computerized medical records. I know of a number of individuals who are indeed interested.

Most definitely, however, they had nothing to do with the special task force to develop legislation concerning the maintenance of confidentiality of computerized records. This task force was originated by the Washington State Medical Record Association, a professional group affiliated with the American Medical Record Association and totally unrelated to the physicians' professional association in this state.

Lynn Regudon

Chairman, Task Force on Legislation  
Washington State Medical Record  
Association  
Seattle, Wash.

### Anyone Selling \$60 Mini?

Re: April 11 article "Hardware 'Available' for \$60 Mini."

Where can I get a \$60 mini? I'd like the challenge of developing my own software.

Carl M. Vigil

Schertz, Texas

The reference was made by Claude Kagan at Western Electric, Box 900, Princeton, N.J. 08540. Ed.

## Descriptive Billing Expensive

By Kenneth E. Rohan

Special to Computerworld

In regard to the article entitled "The Professional's Viewpoint—More Description Needed in Descriptive Billing Uses," [CW, May 2] Joseph Rigo's comments may render descriptive billing less cost-effective than country club billing.

Country club billing requires the credit-card organization to return all sales receipts along with the monthly bill to the cardholder. This means the organization must maintain a file of the incoming receipts for each and every cardholder on a monthly basis, which is an expensive proposition and the reason why many are leaning toward descriptive billing.

Rigo is absolutely correct when he says "a descriptive bill should be sufficiently detailed so that the person receiving it knows what he or she is being billed for."

Unfortunately, the cost of storing and printing such information on a monthly basis by the credit-card issuers could be equal to or greater than present-day coun-

try club billing costs. We are rapidly moving into the era of the credit-card reading terminal. The best place to capture total sales information is at the point-of-sale. Data would be available at the merchant's terminal and be easily transmitted to the central computer of the credit-card issuer.

Hence, credit-card issuers who do not or cannot make use of credit-card reading

### Viewpoint

terminals, will be hard-pressed to come up with an adequately described bill. Their only salvation may be a system whereby incoming sales receipts are recorded on video-tape during the course of a given month, sorted by image and cardholder sequence at billing time, and send printed copies of the cardholder's actual sales receipts.

Kenneth Rohan is director of Kenro Management Associates, Oceanside, N.Y.

## CDP Examination Performs Service To Profession

"Useless," "dead," "too easy" and "never work" are a few of the phrases I've read in *Computerworld* recently regarding DPMA's CDP examination. It seems to me that skeptical people assuredly used these same phrases in commenting on the Wright brothers' attempt to get off the ground.

Having taken the 1973 CDP exam, I offer the following comments:

It is absurd to state that "cramming from one of the study guides" can insure easily passing the exam. The study guides are "reviews" by nature and unless there is the necessary supporting experience, they are just so many words.

The exam is a good objective evaluation of an individual's DP and general management skills. The majority of my associates (eight of us took the exam) appreciated the objectivity and worthiness of the

questions.

Classroom and seminar preparation for the exam and/or passing it assuredly demonstrates a broader DP knowledge level.

A CDP has evidenced a quest for professional certification—the true professional is the first of his profession to seek this certification.

He has also shown a broader base from which to adapt to the DP environment and the ability to place DP in its proper perspective with the other functions of operating a business.

While I too feel the exam must be time-phased to be more relevant, I am convinced that DPMA has performed a great service to our profession in pioneering this certification program. I am also convinced that DPMA will maintain the exam, improve it and develop it into the equivalent of any profession's certification.

Michael D. Campton  
Project Leader

Inso Systems Corp.  
Manufacturing Systems  
Neptune, N.J.

## Competent Hand-Holding Can Make the Difference

Re: "It's the Hard Way to Break Into DP" [CW, March 28] and "Holding Hands Can Be Painful" [CW, April 25].

Perhaps the problems encountered could have been greatly lessened by choosing the right vendor.

We converted from a service bureau to an IBM System/3 Model 10, with very little help from the service bureau. However, the support from IBM was nothing less than fantastic. They literally held our hand every step of the way, from training, to conversion, to production. The only difference was the competence of the people holding our hand.

I find it very hard to believe that any vendor still in business would allow its customers to write one superprogram designed to do all. Mounds of experience are not needed to know that some sort of data base is imperative.

Perhaps the extra rental charge incurred from going with the "giant" should be viewed in a different light: Is it really worth the monetary savings to get a system that doesn't work for you?

Thomas E. Negola

Garwood, N.J.

## RPG Efficient, Economical

I have been reading several letters to the editor in the past two issues of *Computerworld* concerning RPG languages.

It is my belief that the authors of these letters are not as knowledgeable as the true power of RPG as their letters would insinuate.

Norman F. Allen wrote [CW, April 25] that he believes an RPG installation is an "operational nightmare." He points out that the company involved in the operation could develop "heart failure due to some key personnel involved in the RPG program going on vacation." Any organization that is so reliant upon any individual, be it an RPG programmer, Cobol or any other language, is in itself a failure.

Before anyone criticizes RPG languages, I recommend they be involved in paying all expenses connected with data processing. RPG is a management tool geared for an efficient and economical method of producing the necessary reports and results.

It is time that the RPG language be given full exposure as to its capabilities and efficiency. Perhaps the biggest injustice performed was to call the 360 version of RPG, RPG. This has caused many persons to equate the 360 version to the old 1400 version (which was by far no competition to the current version).

Philip J. Pesapane  
President

Computer Procedures Corp.  
Valley Stream, N.Y.

## Big Performance.

# Century 101.

Now small and medium size businesses can have the big kind of computer power they need to grow.

The newly released peripherals for the NCR Century 101 processor are small in size and low in cost, yet they provide the power and versatility of units twice their size. This basic 101 system, including processor, card or paper tape reader, line printer, and one dual platter disc unit covers no more space than 2½ feet by 10 feet! It can be placed in rooms where larger computers just won't fit. And, because it generates little heat, air conditioning requirements are minimal.

Big advantages in small packages include freestanding add-on dual platter disc units, each having a storage capacity of 10 million bytes. A line printer that turns out 300 lines of crisp printing per minute. And an optional 30-character per second I/O Writer.

The 101 processor, heart of the system, includes features like a high-speed memory that can expand in practical increments from 16K to 64K. An optional multiplexor that provides control for 10 communications lines, with no increase in cabinetry. Seven-way to nine-way simultaneity. And many other features just as significant.

Later, as your business grows, you can expand this modular system to meet increased information requirements. Larger capacity disc units and higher speed printers can be added if and when you need them.

For the price, this new system from NCR offers big performance for businesses on the grow. Average systems range from just \$1820 to \$3800 per month!

Call your local NCR office for the specific advantages your business can expect from this newest member of the NCR Century family.

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lightweight, pedestal type LINE PRINTER turns out 300 lines of crisp printing per minute.



the 101 PROCESSOR features high speed expandable memory, optimum hardware/software efficiency, dramatic throughput capabilities. CONTROL CONSOLE facilitates communication between operator and processor. Hard working CARD or TAPE READER (COT) assures fast, reliable coded input.



DISC FILE storage provides ten million bytes of ready information in each single spindle dual platter disc unit.

# The Olivetti girl presents her family

## of Olivetti terminals:



Meet the direct descendants of a distinguished line of Olivetti information systems that started a half-century ago. It's a big, big family adaptable to almost any situation. With over 50,000 already installed!

- Teleprinters for administrative tasks.
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- All displaying those fine old Olivetti family traits of ingenuity, great design and terrific service backup. (There are Olivetti branch offices all over the U.S. with trained personnel on call!)

Ask us for a proposal on your next terminal installation. Join the family.

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- accounting systems
- electronic filing systems
- microcomputers
- on-line systems
- office copiers

### Letters to the Editor

#### Alfips Report Refers To New DP Entrants

The letter from Steven R. Weber in the May 2 issue of *Computerworld* suggests that the American Federation of Information Processing Societies (Alfips) drew the wrong conclusions about the availability of trained computer personnel in its recent report entitled, "The State of the Computer Industry in the United States" (CW, April 11). Unfortunately, Weber appears to have rushed into print without reading the Alfips report.

The only conclusion on manpower included in the Alfips report is, "in view of the growth of formal programs in computer education, it appears that within a decade such sources should be able to fill the needs of the computer industry for new entrants even if industry requirements grow at the rate of 10% per year."

There is absolutely nothing inconsistent between this statement and that of the Advertising Council that the lineage of help wanted advertising for data processing personnel is at a high level. The Alfips conclusion refers to the next decade and it addresses the new entrant situation, not the need for experienced personnel.

Bruce Gilchrist  
Executive Director

Alfips  
Montvale, N.J.

#### Keypunch Replacement: A Success Story

Re: the article in the April 11 issue about keypunch replacement.

Our firm has been successfully converting keypunch input operations to 2260 on-line entry for the past three years and have at this time completely converted the operation.

Some of the jobs include order entry, order update, customer master file addition and change, price change, accounts receivable, accounts payable, inventory entry and activity detail, payroll, department transfer functions and other forms of entry.

We have experienced no decrease in speed of entry of 8,000 to 9,000 items daily and have found it to be more accurate because of the immediate verification.

R. A. Hoover  
DP Manager

Coastal Data Inc.  
San Francisco, Calif.

### 'An Operator Mounted The...WRONG TAPE'

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Every day, in thousands of data centers throughout the country, this same scene is repeated. It can be prevented. Value Computing has developed a new and different approach to Tape Library Control. The VALU-LIB system will tell your tape librarian which tapes to withdraw to get the best multiprogramming schedule, and then generate the labels, if you'd like!

OS/DOS, standard, non-standard and unlabelled tapes — they're all the same to VALU-LIB.

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TELEPHONE \_\_\_\_\_

# SOFTWARE & SERVICES

## Random Notes

### AED Programming Language Available for Univac 1108

WALTHAM, Mass. — A Univac 1108 version of the AED programming system is being offered by Softech, Inc.

The system consists of a compiler for the AED programming language, and various libraries and support programs. With this offering, AED is now available for the CDC 6000 series, Univac 1108 and IBM Systems/360-370, as well as for various minicomputers.

Programs developed in AED are transportable between any of these systems.

Purchase price for AED-Univac 1108 is \$15,000 and includes one year's maintenance and a program of user training, from 391 Totten Pond Road, 02154.

### Cullinane Output Packages Linked to RDMS Data Base

BOSTON — Cullinane Corp. has announced that all its report-producing systems are now operational with UCC's "RDMS" data base system for banks.

Concurrent with this announcement, the firm stated that Market-EDP-Analyzer is available for use with data base systems such as IMS, Total, RDMS, Bomp and AIs.

Cullinane Corp. is at One Boston Place, 02108.

### Basic Addition to Datapoint 2200

SAN ANTONIO, Texas — Datapoint has announced an extended Basic language processor for the Datapoint 2200 intelligent terminal. It is a stand-alone system requiring a 16K Version II Datapoint 2200.

This implementation of Basic includes a floating point arithmetic package, support for two dimensional arrays of strings or numbers, internal subroutines and error recovery techniques. Other languages on the Datapoint 2200 include Databas, Scribe and an Assembly Language. Datapoint is at 9725 Datapoint Drive, 78284.

### Terminal Users Write Letters

NEW YORK — Personalized form letters can be generated on-line, from original draft and definition of addressee list through final typing, under the WordOne service from Bowne Time Sharing Inc.

Working at a terminal, the user creates the master letter and specifies where personalized inserts should be made. The master letter is merged with a pre-stored name/address list that also contains the specific information to be inserted. The final letters can be produced on the user's teletypewriter or, in case of a large mailing, on Bowne's high-speed line printer. Bowne operates WordOne in the eastern U.S. and is based at 345 Hudson St., 10014.

## New Cobol Feature

# Users Can Pick Collating Sequences

By Don Leavitt

WASHINGTON, D.C. — Cobol programmers would have very broad powers to specify, program by program, the collating sequence to be followed during the execution of their logic, and the code set to be used by the file being processed, under changes voted into the language by the April meeting of Codasyl's Programming Languages Committee (PLC).

The change was requested by the American National Standards Institute Committee X3J4, which later voted to include a restricted version of the new capability in the proposed Cobol standard revision [CW, April 4]. Action on the collating sequence feature was handled on a priority basis to answer a number of user requests received during the open comment period, X3J4 chairman Robert Kearney of Bell Labs noted.

Even the restricted implementation should make both programs and files "far

more transferable than they have been up till now," according to PLC secretary William Kinshul of the U.S. Air Force, who proposed the change.

Cobol is supposed to make programs transferable and there has been movement in that direction, especially since the 1968 Cobol standard. PLC has the job of defining Cobol as a complete language system; X3J4 extracts what it feels is a workable subset of the whole language, refines it into a voluntary standard.

But prior to the latest PLC action, the collating sequence used by programs has been determined by the "native" code set of the computer system on which the programs were developed, and they could not be altered to match the sequence scheme of a different code set.

### Override 'Native Mode'

Now the programmer will be able to override the "native mode" bias of whatever compiler and machine combination

he is using. PLC voted to give the programmer both static and dynamic capabilities to specify the setting he wishes. X3J4 added just the static facility to the upcoming Cobol standard revision.

The static option allows entry of a completed COLLATING SEQUENCE IS clause in the Environment Division, so that the compiler could shape comparisons and other sequence-dependent instructions for the code set being used. The dynamic option would allow the clause to be completed or changed just prior to program execution, or even in the middle of a run.

PLC voted to allow many possible ways to complete the COLLATING SEQUENCE IS clause, including a "native mode" sequence that is peculiar to the implementation, or one that is user-defined through a string of literals listed in exactly the sequence required. X3J4 accepted all the options, except those that only pertained to the dynamic capabilities.

While user control of collating sequence focused primarily on the Nucleus of the Cobol language, related capabilities were added to the Sequence and I/O module and to the Sort/Merge. This will allow the program to work with tapes and other non-mem storage files coming from or going to systems working in codes other than the one to which the user's program is "tuned" through the Nucleus entry.

User control of collating sequence, especially with the user-defined feature, is expected to allow placement of records in precisely the sequence the user wishes, regardless of the mix of numerics, alphabetic and special characters the control field may contain. An EQUATE capability will allow the user to determine exactly where, for example, the 797 Corporation, or du Pont, or D'Unger belong on his files.

## 'Valu-Lib' Runs Tape Library, Can Interface With Scheduler

CHERRY HILL, N.J. — A magnetic tape control system that differs from most others by including an interface to both a scheduling package and a job accounting system, is now available for both OS and DOS/360 users, from Value Computing Inc.

Valu-Lib accepts data from IBM's System Measurement Facility (SMF) under OS, or from feedback cards generated by DOS operations. It creates, changes and deletes information from a Workload Control File, and produces a Tape Retention Report and a daily Scratch Tape Report.

The Control File has three basic sections, one of which holds the number, manufacturers' names, locations and reporting exception limits of the tapes to be controlled. It also includes volume serial number information to identify the specific tapes, and job information to identify the applications — and programs within the applications — in which each tape is to be used.

When used with Value's Scheduler package, the file produces a "tape pulling" list to notify the operations staff which files will be needed over various periods in the future. Later, it also produces gummied labels for external identification of the files created during the just-completed processing.

Even without Scheduler, Valu-Lib can generate a tape pulling list based on frequency codes built into the control file records. This list is in job number sequence rather than scheduled-time sequence as it is through the link-up with Scheduler, a Value spokesman noted.

In stand-alone mode, Valu-Lib can also print gummied labels as tapes are created. These labels can include prompting comments to show, for example, that a given reel is the last of five making up a large file.

The system is written in Cobol and can be used in either OS or DOS environments. It requires 50K bytes of memory, spool-in/spool-out capability, 50 cylinder of disk state space, and, if SMF is used, a tape for that data. The price is \$4,000 for DOS, and \$6,000 for OS users.

Value Computing is at 496 North Kings Highway, 08034.

## Package Builds GCOS/TSS Tests

McLEAN, Va. — Testdata Systems Corp. has developed a Load Generator System that allows Honeywell H600/6000 GCOS/TSS installations to test configurations under large user loads. The testing package pinpoints the conditions under which response time degrades to an unacceptable level — as defined by the user.

Need for the Load Generator became apparent, Testdata explained, as a result of work the company is doing for Honeywell that will enable GCOS/TSS installations to support as many as 180 simultaneous terminal users. Those and other changes to the operating system will be released in October, Honeywell said.

Regardless of how large a terminal load is being generated — and Testdata noted that actual jobs are created, not simulated — all the testing under Load Gener-

ator is done from one on-line terminal. Output consists of user response time data for each completed activity.

The Load Generator allows the user to measure exactly what effect a change in configuration, whether internal buffer size or device used for program swapping, will have on response time.

The package enables an installation to perform hardware checkouts and to pinpoint malfunctions that may only occur with very heavy user loads.

The Load Generator has been successfully installed on both H600 and H6000 single and dual processor systems, he added, and the package is now available for a lease price of \$15,000 mo or under a 20-year license for \$15,000.

Testdata is at 7900 Westpark Drive, 22101.

# For MMS General Ledger Systems 1973 Will Be A Vintage Year.

Since January, 7 companies ordered the MMS General Ledger System. Each one of these corporations is worth more than \$20 million (one is in the \$800 million class). They all have the promising staffs and the resources necessary to develop their own corporate financial systems. Instead, they chose the MMS General Ledger. A software package. Their reasoning is simple: it costs less to use a proven package (more than 50 users have installed it in the past three years). Also, it fits their needs rather than the other way around.

For these happy users, 1973 will be a vintage year. Call or send in the coupon today. Then get ready to join the celebration.

Cheers!

I'd like a taste of the following MMS Financial Reporting System(s). Please send me information on:

☐ General Ledger ☐ Accounts Receivable ☐ Accounts Payable

☐ Inventory Management

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## T/S on PDP-11/45

## DEC Puts 32 Users on Maximum RSTS/E Configuration

MAYNARD, Mass. — PDP-11/40 and 11/45 minicomputer installations are able to support as many as 32 simultaneous terminal users working in an enhanced Basic, with the extended version of the RSTS time-sharing system (RSTS/E) now available from DEC.

RSTS/E requires a minimum configuration of 40K words of memory which would allow one user to work in as much as 16K words — twice the previous limit, or two users to work with 8K words. Maximum configuration is 124K words, a company spokesman noted.

The superset of original Basic provided by RSTS/E is called Basic-Plus and includes:

- Record I/O, which allows each user to access disk files both randomly and sequentially, and to adjust buffer spaces and disk allocation techniques to optimize throughput.
- Virtual memory arrays that can

consist of integer, floating point and character data.

- On-line access to all system peripherals, including shared use of files where appropriate.

- Language extensions to permit more sophisticated program logic than the original, low-key language would allow.

## Larger Arrays

The array processing under RSTS/E allows the user to store arrays larger than available in real memory out on disk and to maintain and use them as if they were stored in real memory. Swapping of the parts being utilized is completely transparent to the user, DEC said.

While RSTS/E permits as much as 16K words to be allocated to a single user, it does not require that all users get that much space. The system manager can, for example, limit users to no more than 8K so that the system resources are in fact

shared in a reasonable way, and not "hogged" by one or two jobs.

Under a job control system that is part of the supervisor, programs can be chained from on-line disks without operator intervention, to simplify execution of complete applications.

RSTS/E permits the use of mixed core and semiconductor memory to reduce the time spent in system overhead. Users are encouraged to load their RSTS/E Basic interpreter and the run-time system in a 16K word segment of semiconductor memory — with cycle time of 450 nsec — while the application programs utilize standard core memory — with cycle time of 900 nsec.

Typical system costs range from \$82,000 to \$195,000. An \$85,000 system is configured around a PDP-11/40 with 40K words of core memory. Peripherals include a fixed-head system with 256K words of storage and a moving-head

disk system with 1.2M words, two DEC tape units and eight line interface units. Terminals are not included.

The \$195,000 system is configured with an 11/45 with 64K words of core memory, a floating point processor and 16K words of semiconductor memory.

Peripherals include 40M bytes of moving-head disk storage and 512K words of fixed-head disk storage, tape drive, 300 line/min. printer and 32line interface units.

## 20 Users, 124K Words Supported by 'Mumps' From Software House

WAKEFIELD, Mass. — Mumps, a multi-user timesharing operating system and database management language first developed for hospitals but now being applied in non-health care operations as well, has been enhanced by Automated Health Services Inc. (AHS) to run on the DEC PDP-11/45.

By shifting Mumps to the top of the '11' series, AHS has been able to utilize DEC's memory management system to control core addresses above 38K, the effective limit on the smaller PDP-11s. Now, 20 or more interactive users can work with Mumps concurrently on the 11/45 which has an effective core of 124K, the company said.

Mumps was created for applications requiring sophisticated data base management and rapid information retrieval. It uses unique file structures called "globals" which are processed like sparse arrays. The new Mumps allows the user to work with blocks within "globals" and these may be created, modified, deleted or moved from one file to another without having to handle the entire data base.

Memory segmentation for large-scale systems is available, AHS noted, and interprocessor communications facilities permit a Mumps-based 11/45 to be linked to other CPUs for more flexible operations.

Application programs are available in the Mumps language, especially in hospital-related functions, but innovative users have applied Mumps to work in other projects including, for example, control of a containerized shipping operation, AHS said.

AHS can install Mumps on any DEC PDP-11 with at least 16K core and a CP clock for time-alcing, a disk and a backup storage media, and terminals, including either teletypewriters or CRT devices. The Mumps software, exclusive of application packages, is \$10,000.

Programs for clinical laboratory information processing, hospital administrative functions, clinic managements, patient interviewing and multiphase health testing control and documentation are among the applications which AHS can tailor to a user's specific needs.

AHS is at 607 North Ave., 01880.

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## Seven Areas to Gain GE On-Site Support

BETHESDA, Md. — GE's Technical Services Operation, providing on-site support, custom software and specialized systems development for users of Mark III remote-computing systems, has been extended into seven metropolitan areas. New offices are being set up in New York, Chicago, Atlanta, Houston, Boston and Los Angeles. The original office at 7735 Old Georgetown Road, here, will continue to serve the Washington, D.C. area, a spokesman noted.

The service should be "especially useful" to firms confronted with unusually complex applications or seeking to optimize their use of GE resources, he added.



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**Why Datapoint?** "The Datapoint 2200 meets the needs of our hospital and health center clients more fully and more satisfactorily than any other computer system," notes Don Olson, Executive Data president. "Its full programmability and the availability of DATABUS, a high-level programming language, makes it easy to adapt the system to the varying data entry requirements of our clients. On the 2200's video screen we can display the precise format for data to be entered, which, combined with programmed error checks, virtually eliminates input errors. Since the 2200 is as easy to use as a typewriter, there's no need for special operator training as with a keypunch machine. During the day the transmission of data to our central computer occurs automatically, without the need for manual dialup. Similarly, needed management reports are sent out automatically from our central computer during the night to an unattended 2200 printer, ready for management to use the very next morning, when the information is really timely and useful."

**Every hospital and health center** has varying needs for computer service, which can range from simple bookkeeping to sophisticated computerized analysis. Executive Data's approach is to provide these services on a modular basis. "Because the 2200 is a fully programmable general computer, it can handle much of the burden of editing and pre-processing of data," said Mr. Olson. "This relieves much of the overall processing load on our large central computer systems. Additionally, as hospital users grow more sophisticated and demand more and varied applications, we expect to see the Datapoint 2200 used more frequently as a supplemental independent processing unit."

**The Datapoint 2200** and associated peripherals have delivered the goods for Executive Data Systems and its numerous hospital subscribers in a variety of applications in data entry, data communications and dispersed data processing. Prices on this unique system begin as low as \$6,040. For information on how this capability can be put to work in your operation, contact the Datapoint sales office nearest you or write or call: Datapoint Corporation, 9725 Datapoint Drive, San Antonio, Texas 78284.



"The Datapoint 2200 has been a key factor in the continued growth of Executive Data and in our ability to provide the finest computing services in a modular and economic fashion to our clients. As the health care field grows more aware of the capabilities of our service in combination with Datapoint systems, I anticipate a steady rise in the number of our subscribers and in the processing volume we undertake for them."

Don Olson, President,  
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# COMMUNICATIONS

## Data Briefs

### Incoterm Sees Bell CRT Cost '\$500 Below' 3270

WASHINGTON, D.C. — AT&T's Model 40 CRT will be priced between "400% and 500%" lower than comparable IBM equipment. The Model 40 will cost between \$3,000 and \$3,500 while an IBM 3270 system costs about \$16,070, according to Incoterm Corp.

The comparison was included in a letter to the Federal Communications Commission from Incoterm, which had previously told the FCC that the Model 40 marked the Bell System's entry into the area of data communication terminals [CW, Feb. 21].

AT&T responded that the proposed CRT, to be built by Teletype Corp., was not a data processing service [CW, March 28]. Incoterm said the AT&T reply was "evasive and misleading."

The independent CRT firm said "AT&T's real interest is... data processing... where the primary function of the Model 40 would be for the generation of inquiries and the reception of data from a central computer."

### Modem Operates Automatically

TARZANA, Calif. — Novation, Inc. is offering an automatic answer/originate data modem which has unattended data reception capability.

The ATM-103D is Bell 101C and 103 compatible, and was designed for Teletype and TWX users, as well as Data Phone service.

The equipment features self-testing capability, optional voice capability, on-line local mode, echo mode and selectable full/half duplex.

Installation requires no modifications to the Teletype unit, the firm said, and all access is through normal connectors and terminals.

The unit costs \$550 and should be available within a month from 18664 Oxnard St., 91356.

### Concentrator Handles 32 Channels

NORWOOD, N.J. — Timeplex's C-32 Data Channel Concentrator can handle up to 32 channels which share up to 16 computer ports.

The C-32 is designed to connect data from modems, terminals or multiplexers on a first-come, first-served basis, making the connections in response to such signals as Data Terminal Ready, Ring Indicator or Request to Send.

The C-32 requires no speed or code programming and can switch asynchronous or synchronous data at rates up to 9,600 bps.

Prices for the Timeplex C-32 start at \$3,250 and delivery is 60 days. The firm is at Box 202, 65 Oak St., 07648.

## Harris 4705 Replaces IBM 270Xs, 370Xs

DALLAS — Harris Communications Systems Inc. has introduced the 4705 communications controller which is described as a replacement unit for IBM's 270X, 3704 and 3705.

The 4705 can operate on the multiplexer channel of 360/370 mainframes and features faster internal speeds than the IBM 3705. The Harris unit has a 1/2 msec read-write time compared with 1.2 msec for the 3705. And the read-only memory operates in 250 nsec compared with 400 nsec on the 3705, according to a Harris spokesman.

The 4705 has a separate console printer while the 3705 normally uses the host CPU console. The Harris controller can utilize either a Model 33 KSR Teletype or a Cope 1035 which is equivalent to an IBM 2741 teletypewriter. With these two options, the user can load his emulator and/or diagnostics using either paper tape or magnetic tape input, in addition to

utilizing the host console.

The 4705 responds to IBM system addresses, commands and data sequences in the same manner as IBM controllers and it can operate with Bism, Qsm and Team without programming modifications, according to Harris.

The controller supports both two-way and four-way facilities and handles both synchronous and asynchronous lines from 45.5 to 9,600 bps. A typical system supporting four bi-synchronous and 20 asynchronous low-speed lines will cost about \$1,276/mo.

Rentals will be about 12% below the 3705 while purchase prices will be about 15% less than the IBM unit, a spokesman estimated. First deliveries are scheduled for June.

Harris is at 11262 Indian Trail, Box 44076, 75234.

### '30% Causing Harm'

## AT&T Blames Non-Bell Equipment

By Ronald A. Frank  
Of the CW Staff

WASHINGTON, D.C. — About 30% of the customer-provided communications equipment installed in the phone system is actually causing harm to the network, according to AT&T.

In a submission to the Federal Communications Commission, AT&T said customer-provided equipment has "a higher trouble rate" than phone company equipment. Customers with non-Bell units "tend to call the telephone company when they experience a problem... and this results in a diversion of telephone company repair personnel" away from maintaining Bell equipment.

In a letter sent to the FCC's common carrier bureau, AT&T said 8.5% of users with non-Bell equipment on interstate private lines "are applying signal power in excess of the established criteria, thereby degrading the service of other customers." The criteria used for determining the harm were based on a report by the National Academy of Sciences on interconnection issued in 1970.

"A significant number of users are causing harm to the telecommunications network both on private line and switched network services," AT&T said. To remedy the situation Bell said "it is clear that preventive network protection rather than corrective action is needed to ensure that services... for all users are not degraded...."

In a two-month period during 1972, Bell said 10,124 trouble reports at installations using non-carrier equipment on both dis-lap and private lines were studied. In 48% of the cases the "source of the trouble was found to be in the customer-provided terminal equipment."

This represented "almost 30,000 unnecessary dispatches of our repairmen to tell the customer his equipment was at fault." But at the same time Bell admitted that 38% of the trouble calls were caused by telephone company equipment.

In the 4,973 cases where customer-provided equipment was to blame, 30% were actually causing harm to the phone network, Bell told the FCC.

Citing a "case history," AT&T said a "computer inventory control system for a food store chain" with independent data sets "in Missouri" had experienced "excessively high error rates." The data set supplier "made an effort to solve the problem by increasing the signal power of the customer-provided data sets through the installation of amplifiers on the circuits." The amplified signals were "30 to 100 times the proper adequate level," Bell claimed.

The amplifiers were "generally installed between the data set and the [Bell] Data Access Arrangement" so the network was protected from the harmful effects, the letter said.

Some of the amplifiers were installed between the DAA and the line but there were "few such connections" and the

resultant harmful effects were "not readily identifiable," AT&T said.

But the high error rates continued and "after a lengthy investigation," the problem was traced to a "limiting problem between the customer's computer and his data sets," AT&T said.

As part of its comments, AT&T included photos of independent data sets where it was possible that "hazardous voltages" could be applied to telephone lines. The data sets shown in the photos were not identified, although they were described as "commercially available."

Asked by Computerworld whether AT&T would identify the non-Bell equipment which was claimed to be defective and/or the Missouri data user who had excessive error rates, an AT&T spokesman said the company had no comment.

An FCC spokesman said the commission could ask the phone company to provide more details but a decision had not yet been made.

## NCR 255 Checkout Terminals Handle Store Transactions

DAYTON, Ohio — NCR has introduced an interactive mini-computer controlled terminal system designed to handle supermarket checkout operations.

The 255 system includes the 726 mini and a terminal that includes an MOS read-only memory. The processor operates in real time with the checkout terminals handling transaction data on a character-by-character basis.

The 255 system is modular and will allow later addition of scanning equipment to detect the recently approved Universal Product Code when a majority of supermarket products are marked with the symbol. In the future, the system can be equipped with a remote display for management, electronic scale and coin dispensing equipment.

Each terminal prints out customer

receipts, calculates taxes, allows for coupon redemptions, gives food stamp credits and performs all arithmetic functions associated with the checkout transaction.

The 255 system can supply management with complete operating data including volume of sales by item, hourly sales totals, operator productivity and sales by department.

The basic processor includes 20K 16-bit words which can be expanded in 4K increments up to 32K. The mini costs \$13,000 and the basic terminal is priced at \$2,895.

A check endorsement option adds \$300 to the terminal price. Up to 48 "devices" including terminals and options can be handled by one processor. First deliveries are scheduled for this fall.

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**Us.** Anybody who says they can do all this is worth talking to. Call Ron Doiron at (714) 778-4800. Or write him in care of General Automation, Inc., 1055 S. East St., Anaheim, Calif. 92805.

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## Also Hard Copy

### Tektronix Adds CRT Unit

BEAVERTON, Ore. — Tektronix has introduced a CRT terminal and hard-copy unit to its line of displays. The 4023 adds a video display to the firm's earlier storage tube devices.

The 4023 has a capacity of 1,920 characters (24 lines, 80 char./line) on a 12 in. screen.  
Editing features include insert character and line, delete character and line, replace, erase to end, erase input and erase page. There are also tab, back tab and repeating character keys.

Forms can be "ruled" with an optional package that draws solid horizontal and vertical lines. Visual field formats include inverted field, blanking field, blanked field, reverse field, blinking reverse field and dim field.

Logical formats include transmit, non-transmit, protected, non-protected and numeric only.

The Tektronix 4023 is priced at \$2,995 or \$98/mo including maintenance.

#### Hard Copy

The 4632 hard-copy unit can be interfaced with the 4023, as well as as Hardline, Sandline, IBM 3270 and other similar display terminals. The 4632 is priced at \$2,950 or \$98/mo and will be available for first deliveries in October.

First deliveries of the 4023 CRT are scheduled for July. The firm is at Box 500, 97005.

## CDC Multistation Has Printer/CRTs At Remote Sites

MINNEAPOLIS, Minn. — Control Data has introduced 714 multistation terminal systems for users who need multiple display/printer capability. The systems are designed for communications line efficiency at remote sites.

The multistation configurations use the 714-122 display which handles eight lines of 80 characters or the larger 714-123 which displays 16 lines of 80 characters. Both displays offer either 63 or 96 Ascii characters.

The multistation systems offer two types of printers, the 711-1-20 non-impact unit for desktop use and the 711-121 impact printer which handles up to six copies. Both printers operate at 30 char./sec.

Two controllers are available. The 714-10 is designed for sites with minimal printout requirements while the 714-20 multibuffer controller handles up to seven printers simultaneously.

A 714 system can be configured with up to 15 printers and/or displays on one controller. A typical configuration of five displays, two non-impact and one impact printer will cost from \$30,810 to \$34,810 depending on equipment. One year lease prices for the same configuration without maintenance will range from \$810/mo to \$903/mo. First deliveries are scheduled for the fourth quarter of 1973.

## User Gets 'Addicted' To Teletypewriters

KANSAS CITY, Mo. — In setting up communications capabilities, users should plan for expansion, because once the capability is available, people become "addicted" to the system and want more, panelists at a communications session of Computer Caravan '73 agreed.

Dave Nordlund of the University of Kansas noted that after a professor has had a teletypewriter in his office for about four months, he "can't possibly live without it, and wants five more."

One has to begin with the basics, but good planning can avoid making expansion a "traumatic experience," he said.

Frequently, new applications require different facilities, warned Don Class of the Kansas City Police Department.

Users should take a careful look at "how to divide terminals on lines." Class cautioned, "It's very easy to overload a line and then you have to pay an installation charge."

He said his department has always underestimated demand. "Show us users something and they want double that amount," he said.

# SYSTEMS & PERIPHERALS

## Bits & Pieces

### Varian Printer/Plotters Attach to CDC Computers

IRVINE, Calif. — Varian Data Machines has announced an interface which can connect its CDC 3110 or 3111 printer/plotter to any CDC 3000, 3000 or 7000 series computer.

Varian said the interface plugs into standard CDC data channel cables. It has I/O that mates with the I/O connector on the Status unit.

Status is an electrostatic printer/plotter capable of 1,000 line/min.

The interface sells for \$12,000. Delivery is 30 days from 2722 Michelson Drive, 92664.

### Calculators Have Program Memories

LOS ANGELES — Computer Design Corp. has extended its line of portable microcomputers with two scratchpad calculators which each feature two, 80-step program memories.

The hand-held models are the 324 Scientist and the 344 Statistician.

The units are battery operated, have multiple storage registers, and calculate to 13 digits. The Scientist features mathematical and trigonometric function keys while the Statistician offers statistical operations.

Deliveries of the \$895 Scientist and the \$1,095 Statistician are scheduled to begin in April.

Computer Design is at 12401 W. Olympic Blvd., 90064.

### Microfiche Unit Makes Multicoopies

NORTH BERGEN, N.J. — Automated, programmed, multiple-copy pinback from microfiche is possible with the Three/For Enlarger/Printer, according to a spokesman for Cradco, Inc.

The Three/For produces printout from NMA or Cosati format microfiche and will accept certain aperture card and jacket formats, he said.

Working from either a 98-image or 60-image fiche, users can make from one to 10 8-1/2 in. by 11 in. prints in succession from each fiche image.

Average cost per copy has been set at 2 cents for 8-1/2 in. by 11 in. copies and 4 cents for the 11 in. by 17 in. copies.

Cradco is located at 4100 West Side Ave., 07047.

### Viewer Has 1,000-Hr Life

MOUNTAIN VIEW, Calif. — Quantor Corp. has a 3/4-size microfiche viewer with a 1,000-hour lamp life.

This extended lamp life is about eight times longer than lamps in currently available viewers, the firm's spokesman asserted.

The Quantor 305 costs \$169 from 520 Logue Ave., 94040.

## Good Support Cited

# First MRX-40 Replaces IBM 360/20

By Ronald A. Frank  
OF THE CW STAFF

MAHWAH, N.J. — A northern New Jersey service bureau for public schools has a CPU with 60M bytes of on-line disk storage. The machine looks very much like an IBM system but it is one of the first Memorex MRX-40 systems.

Educational Reading Service Inc. has had the MRX-40 since late last year. It was running a Model 20 from IBM but more capacity was required, according to Paul Bultmeyer, vice-president.

IBM proposed a System/3 and the user also considered a Model 30 on third-party lease, in addition to a 370/115 and 125. But the MRX was more cost-effective Bultmeyer said. The larger capacity MRX-40 costs about \$5,000/mo.

Although there have been some start-up problems with the system, the user said he is satisfied with its performance. Among the initial operating problems was a jamming condition with the Memorex printer. But field personnel installed a tension device on the unit and it now operates better in many respects than the IBM 1403, Bultmeyer said. One of the features that appealed to him is the crisp type font, he added.

Educational Reading was using IBM's Basic Programming Support (BPS) operating system on the Model 20 and conversion to the MRX/OS operating system was accomplished with a converter program supplied by Memorex.

The converter took the IBM-compatible RPG source decks, and produced an MRX-compatible card deck which could then be assembled on the new CPU, Bultmeyer explained.

### Some Software Difficulties

As with any new system, some software problems did crop up. Educational Reading had a software system that generated blanks in some records, but the Memorex RPG did not recognize the blanks and zeros had to be generated into these records, he said.

But despite the start-up problems, Bultmeyer said Memorex gave him around-the-clock support that he described as being at least as good as the service available from IBM.

Although the Memorex machine appears to have faster throughput, exact comparisons are difficult. One of the biggest advantages is the increased available on-line disk storage, according to Bultmeyer. The Model 20 handled 2311-type disks while the MRX 40 runs with larger 2314 disks, he said. The 20 had a total disk capacity of 10M bytes while the Memorex system can handle up to 90M bytes.

Another advantage of the Memorex system is its capability to run dual partitions. Educational Reading expects to have a new output spooling package from Memorex within six weeks. This could double throughput when combined with

the additional 30M bytes of storage that he has ordered, Bultmeyer said.

With the dual partition operation, the user may later add on-line communications. And a Memorex computer-output-microfilm system could be added to the printer channel to cut output jobs by 90%, Bultmeyer said.

Educational Reading serves public schools with accounting, library circulation records, report cards, attendance summaries and other administrative DP support.

Bultmeyer acknowledges that being a pioneer of the MRX-40 has created some difficulties. At present his software is about 80% converted to the new system. But he said the conversion and hardware support has "really impressed" him, and for future mainframe upgrades he would seriously consider a larger MRX-50.

## Computerized Publishing System Merges Text With Illustrations

BURBANK, Calif. — A modified micro-publishing system developed at Lockheed Aircraft Corp. to meet its technical publications needs, has the ability to merge optical illustrations stored on conventional photographic negatives with digitized text.

"Most computerized publishing systems store both the text and the illustrations in digitized form on magnetic tape," said Ralph Frysart, a Lockheed spokesman. "Storing illustrations in digitized form requires a large number of tapes and is really a costly approach."

"By saving tapes and expense, the resolution of the illustrations is reduced, resulting in poor quality illustrations. The use of photographic negatives eliminates poor quality and saves on expenses," he said.

A computer code keys the photographic negatives into the system, and the Form

Slide, a mechanical handler, accesses the photographic negatives when the code calls for them.

A modified computer-output-microfilm machine then allows the movie camera, which normally takes pictures of what is presented to it on a CRT display, to flash the negative through a two-way viewer.



Charles Voorhees, inventor of the Lockheed system, enters text into the machine via magnetic tape which is then presented to a motion picture camera on a CRT.

Lockheed developed the system over a four-year period, using teletypewriter input for the data and handling the system on its 360/65 with 512K memory.

Programs for the computerized publishing system are written in Cobol.

Lockheed has licensed Database, a division of Media Images Corp., Los Angeles, Calif., to service other publishers or to install the system on either a lease or a walk-away basis.

A spokesman for Database estimated that for a user who already has a central computer, installation costs for the system would run from \$250,000 to \$500,000.

Database is located at 3435 Wilshire Blvd., Los Angeles, 90005.

## S/3 Add-On '25% Off IBM Price'

ORANGE, Calif. — IBM System/3 users can obtain a core memory add-on at a "minimum cost savings of 25% compared to core memory from IBM," according to a spokesman for Business Systems Technology, Inc. (BST).

The BST/3 can be used either as an add-on or replacement memory for IBM-supplied memory above the basic 8K bytes initially provided with the System/3.

The memory is housed in a 6 in. by 18 in. by 24 in. enclosure which contains the power supply and up to 64K bytes in increments of 8K and 16K bytes. Optionally, the memory can be connected to the system by a cable up to 10 feet long.

Performance, according to the firm, is identical to that of IBM System/3 memory. Further, all diagnostics and system software are the same, meaning that no user program changes are required, the spokesman added.

Installation is promised in "approximately two hours" and complete maintenance provided by BST is included in the rental price.

Plans are available to users to lease or purchase the BST/3. In the case of purchased memories, maintenance contracts are available.

BST is located at 747 West Katella, 92667.

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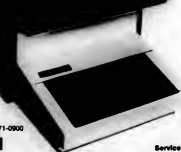
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DUCS-VI will be available during the 3rd quarter of 1973. Version 6 will support both local and remote IBM 3270 Display Systems providing users with a convenient means of utilizing the enhancements of the IBM 3270 System.

Requests for DUCS-V should be submitted to C P S, License agreements, DUCS-V abstracts and other details will be sent by return mail. Inquiries may be directed to Mr. Richard K. Goren.



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## 'Cheaper and Better' University Building Computer

PITTSBURGH, Pa. — A professor and his students at Carnegie-Mellon University are building a general-purpose computer that they say is "sixteen times more powerful than most computers available today, and should be one-fifth to 1/10 the cost of those few which are as powerful."

Known as the Carnegie-Mellon Multi-Mini-Processor the computer is actually a coordinated group of 16 PDP-11-based mini-computers, each with its own memory box, but capable of sharing memory with the other units.

The smaller units linked together are much less expensive than the big machines which would be needed to perform comparable work. Dr. William Wolf said, because "the major cost of building computers today is the hardware — the frame, switches, power supply — not the electronics."

The PDP-11s were purchased for the project because buying them was cheaper than making them, Wolf added. Most other parts of the processor-complex were built by students and university staff.

One of the most complicated jobs was devising a master switch to control access to the various memory boxes, Wolf asserted.

The switch routes a problem to the appropriate memory box, and in cases of conflict, insures that only one processing unit can address a memory box at a time. However, the switch allows independent access to other memory boxes at the same time.

Wolf feels his computer is superior to standard machines which he defines as uniprocessors because they can perform only one function at a time and handle a job by doing various steps in sequence.

Because these uniprocessors can only work on one portion of a job at a time, Wolf said, "there are a number of bigger problems that we cannot do on them."

### Real-Time Speech

One example he cited is real-time speech understanding, a task to which the processor-complex will be applied.

"To understand a limited vocabulary, computers now take 10 to 20 times real time. In other words, the time it takes the computer to understand a spoken word is 10 to 20 times longer than it takes to say it."

"If we can reduce this time with our multi-mini-processor then we'll be able to talk to the machine to give it commands."

Another application cited as ideal for the computer-complex approach is better weather forecasting and radar flight control. Wolf said, a single "uniprocessor" takes about 36 hours to sift through the data needed to produce a 24-hour national weather forecast, thus making the forecast obsolete before it is completed.

The students also developed their own compiler called Pliss.

With Wolf and the students into the second year of their efforts, he sums up the present situation by stating, "We have a small version of the hardware



Professor William A. Wolf holds a printed circuit board and over-looks plans for other boards going into the university-built computer.

working and the major compiler is essentially finished. Work is continuing to build the full-scale computer and iron out any remaining bugs in the system."

## Programmable Word Processor Uses Cassettes

NORTH BILLERICA, Mass. — The Linolex/WP from Linolex Systems Inc. is a text preparation and word processing system built around a programmable microprocessor.

System components include a video display screen, typewriter keyboard and three digital cassettes.

The cassettes serve two functions: storing text typed by the operator and storing programs that allow the typist to edit and perform various automatic operations such as underlining.

The word processing system is capable of handling a variety of output devices including a 30 char/sec printer, IBM Selectric, or 165 char/sec matrix printer. An optional feature allows simultaneous creation or editing of one document while another is being printed.

A communications attachment permits the unit to serve as transmission system or terminal to another computer.

Price of the Linolex/Word Processor is \$17,900 from 5 Esquire Road, 01862.

## Modular Medical System Based on HP2100 Mini

WALTHAM, Mass. — Monitoring critically-ill patients, calculating and analyzing single or bi-plane angiograms, interpreting ECGs, and measuring and displaying forced vital capacity functions and respiratory parameters can all be done by Hewlett-Packard's Medically-Oriented Data System (MOS) for cardio-pulmonary applications.

The system is based on the HP2100 minicomputer using HIP Real-Time Executive software which features multi-programming capability with priority scheduling. The use of terminals stations, such as the Cardiac Catheterization Labora-

tory Station, for collecting and displaying data gives the system modular flexibility, Hewlett-Packard said, allowing customization and gradual upgrade. MOS could eventually be interfaced to a Medical Information Network, the firm added.

The cost of the basic system, the HP2100 with the Executive Software is in the range of \$70,000. Each station/function terminal with the software needed runs \$15,000 to \$20,000. Other peripherals are additional.

The Medical Electronics Division of Hewlett-Packard is at 175 Wymen St., 02154.

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# First-Time User Suggests Go Slow, Maintain Control

**NEW YORK**—The guiding principles for small businesses with their first computers are to go slow and maintain management involvement, according to Edwin Stalzer of Karlans Knitwear Ltd.

"I had no idea how computers worked, but I decided we would have to be responsible for deciding on such a large investment," Stalzer, vice-president and treasurer, said.

With the principle of self-responsibility, Stalzer began looking at different computers and trying to learn what the selection parameters should be.

"Initially, the two main considerations

were cost and simplicity of operation. But soon support became paramount. If we were going to 'go it alone' we needed support, especially in the start-up period. "Thus, even though IBM was more costly than other options, the local sales force and support personnel impressed us and the decision was made to order an IBM System/3 Model 10."

"It was important to me that we wrote our own software because we knew what information the company could use. If you use a canned package, sometimes you find yourself coming to conclusions based on reports that are almost but not quite what you want," he said.

From the initial programs, the company started to expand to more applications. At the same time, Stalzer discovered an unforeseen problem.

The problem was recognizing that the computer was only a tool.

"It was very easy to get caught up in the computer's operation. When we wrote the first few applications, we were here to all hours of the night and became emotionally involved in the operation. When they would work, it was a personal triumph, when they failed we felt it a personal affront," he said.

"But we forced ourselves to be patient and to go slow. Each operation had to be complete before we went on to the next," he explained.

## Hospital Writes Its Own Software

**FAYETTEVILLE, Ark.**—A small computer system using software written mostly by internal personnel is being used to keep Washington General Hospital's inventory costs under control.

As pressure builds to account for dollar expenditures, Washington General has felt it necessary to maintain effective levels and develop better controls of actual stocks.

The key to effective control, according to William Cooper, hospital controller, is a system that provides a close look at investments in general stores and strives to distribute costs more equitably among the departments using the various supplies, equipment and machinery.

Before the computer application, these efforts were bottlenecked in a somewhat haphazard manual card file inventory system, he related.

A new computerized system was written for the hospital's small computer that covers approximately 3,500 items in general stores.

The Perpetual Inventory Control (PIC) was developed within Washington General's own DFP department.

### Files Already There

One of the earlier applications, general ledger, tied in closely with the new PIC system because the general ledger files maintained by the computer were already set up to maintain costs by department. Under the new system, computer control was established for each purchase order written by the hospital's purchasing department. For each item purchased, the orders indicate whether the articles will be maintained in general stores inventory or identify the operating department that will take immediate delivery.

After orders are issued, information on the purchased items is punched into cards and entered into disk files maintained by the computer. The NCR Century 100 has two interchangeable disk packs with a total capacity of 8-M characters.

The computer can interrelate data from these files for processing purposes and to produce analytical reports. Thus, for example, information on open purchase orders can be included with data on stocks on hand for complete status reporting.

As purchased items are received at the hospital, packing slips are sent to the data processing department. From these, cards are punched which when processed by the computer will remove the items from the purchase order file and place them in a record for unpaid inventory. In this file, pricing is based on purchase order information, which includes estimates of costs which cannot be pinpointed, such as shipping charges.

This unpaid inventory file functions as a valuable accounting expedient, Cooper said. It makes it possible to deliver the articles to general stores or the using departments immediately.

This file shows the articles as being in stock in the hospital, but the unpaid file also acts as an accounting suspense file. Costs are carried on an estimated basis until they are known specifically. This facilitates implementation of an actual cost accounting system.

Costs can be allocated to proper accounts exactly when invoices are received. The actual books of account of the hospital carry no estimates or material cost variances.

When invoices are received, cards are

punched with actual costs. When these are processed, items are removed from the unpaid inventory file and allocated in one of two ways:

- Items being charged to specific departments are allocated to the appropriate general ledger cost accounts.

- Items being retained in general stores inventories are charged as actual costs to this inventory account. Then, when these items are issued from inventory stocks, they will be charged to the departments at average costs based on actual prices.

## The Small Systems User

The initial configuration consisted of the central processor with 8K bytes of core memory, a 300 line/min printer and punched card equipment.

"I knew eventually I wanted to go to disk," he related, "but I did not want to make this move until I was sure that the company could handle what we had."

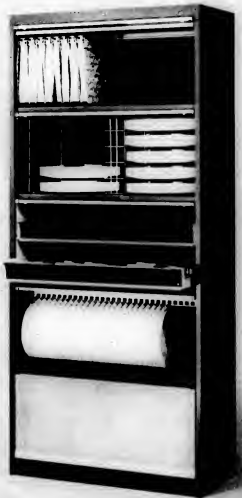
Stalzer started out with simple applications such as entering the number of sales for each style the company produced.

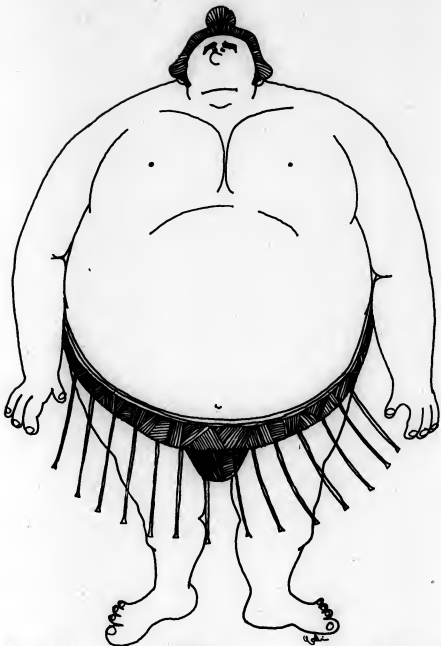
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- *Shukan Computer* is the only newsworthy for the fast-growing Japanese computer community.
- Initial circulation is guaranteed at 35,000, divided about 80% to end-users and 20% to the computer industry. Circulation development methods currently under way are the same as those which gave *Computerworld* the highest paid circulation in its field in less than four years.
- *Shukan* lets you in on the action in the world's fastest growing EDP market. The Japanese Ministry of International Trade and Industry (MITI) has made the following 1976 forecast: 38,000 general-purpose systems installed, up from 11,237 in 1971; 11,000 minicomputers installed, up from 1,670 in 1971; and 3,000 industrial systems installed, up from 1,086 in 1971.
- Is this growth likely? The latest census of general-purpose systems revealed that there were 14,806 systems installed as of September 1972, a one-year gain of 3,569

units and \$911 million installed value, a growth of 31.7% and 23.1%, respectively. And more than 50% of these new systems were American made.

• It is true that there are import restrictions. But Japanese vendors and users can get permission to import almost anything they want and need. As a result, 1972 imports were over \$360 million.

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## Orders & Installations

The city of Baton Rouge, La., has ordered an NCR Century 251 multi-programming system for use in a law enforcement program and general accounting.

Gold Circle Discount Store, Danbury, Conn., has installed a Pitney Bowes-Alpex Spice electronic register system.

Foley's, a division of Federated Department Stores in Houston, Texas, has ordered 797 NCR 280 retail data terminals and associated equipment including three NCR 725 computers.

Engelhard Minerals & Chemicals Corp., Cherry Hill, N.J., has ordered a key-to-disk system from Logie Corp.

H.J. Wilson, catalog store chain, has installed 119 Pitney Bowes-Alpex Spice registers in its nine stores.

Tube Turns Corp., Louisville, Ky., has implemented a Data Technology Industries' Cobol compiler.

The National Shawmut Bank of Boston has purchased an Automated Tape Library Accounting System (Atlas) from GTE Data Services Inc.

St. Paul Computer Center, Baltimore, Md., has ordered a Univac 9480 for use in hospital patient accounting and other business operations.

The Lutheran Hospital Society of Southern California has ordered a Univac 1106 system to form the base of an information system serving seven affiliated hospitals.

Mohr Distributors, operators of Mohr-Value general merchandise stores in Missouri and Illinois, have ordered over 100 NCR 280 retail data terminals and 12 NCR 723 data collectors to convert all its stores to electronic point-of-sale terminals.

Lutheran Mutual Life Insurance Company, Waverly, Iowa, has purchased a TCC Life/70 total information service.

## Report Advises Banks to 'Go Slow' On Buying Automated Teller Units

NEW YORK — Banks have been advised to carefully evaluate the costs and benefits of automated teller (AT) systems, in a report issued by management consultants Colony, Cannon, Main & Pursell, Inc. (CCMP) here.

The firm recommended delay and study by banks. It predicted that machine costs will likely decline by as much as 30% within two years; that second generation machines will make obsolete today's AT systems; security problems will be solved within the next few years; and regulatory constraints on using ATs off-premise may be relaxed.

Although manufacturers have estimated the automated teller market to reach the range of 10,000 to 100,000 units by 1980 with a value of from \$250 million to over \$1 billion, the report cautioned that "few banks will be able to justify automated tellers on economic grounds alone and a large majority may

not be able to justify them at all."

The firm called the automated teller marketing rationale "almost as hypnotic to bankers as to the manufacturers themselves."

### '320 New Customers'

CCMP estimated that "to cover the first year's operating cost of \$16,000 for one off-line automated teller unit, the unit would have to draw \$800,000 in deposits or about 320 new customers."

For banks installing numerous AT units, the report noted: "The first-year operating costs for 10 on-line machines — \$225,000 — roughly equals one fifth of net operating income for the average \$100 million bank and easily exceeds total annual operating costs of three average branches in rented quarters."

"Although prevailing opinion concerning ATs is both noisy and optimistic, we firmly believe it is largely unwarranted, at least for the next few years, and most banks that are lured into large-scale machine purchases will find that considerable risk accompanies the decision to buy," observed senior consultant Brooks T. Chamberlin.

### Need Answered?

"To date we have seen no firm (much less compelling) evidence that these machines actually answer a need, that the consumer population as a whole will accept them or use them enough to cover the substantial investment required to purchase and operate them," the report said.

However, the firm sees success for ATs used in selected situations such as providing services in areas that cannot support a full branch or in servicing specific customer groups such as travelers at airports or workers in industrial parks.

## Five British Firms Planning NCC Exhibits

NEW YORK — The British are coming — to the National Computer Conference (NCC) here June 4-8.

Five British firms, as well as the Business Equipment Trade Association, will be exhibiting at the Coliseum. The British exhibit is jointly sponsored by the trade group and the government Department of Trade and Industry.

The firms include: Altergo Ltd., Computer Cooperatives Ltd., Computer Technology Ltd., Mastertape (Magnetic) Ltd. and Process Peripherals.

The exhibit will feature data storage, visual display units, data transmission and other peripherals units.

"The British computer industry is now growing vigorously again and in an increasingly international environment expects to make serious sales in the U.S. market — particularly in specialist sectors of the market where Britain has some very competitive products to offer," a spokesman for the trade association commented.

## Study of Electronic Funds Transfer Systems Underway

CHICAGO — A study to determine the near-term business opportunities in Electronic Funds Transfer Systems (EFTS), supplemented by an examination of the end-user market and its impact on information systems suppliers, is being conducted by Booz, Allen & Hamilton.

"The ultimate success of the information systems market in EFTS is directly related to whether there is an end-user market for bank EFTS services," a spokesman said.

The study will investigate five areas: corporate funds transfer, consumer funds transfer, point of sale, preauthorized payment and direct payroll deposit.

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## STC Explains Promptness In Announcing New Unit

By Molly Upton  
of the CW staff

LOUISVILLE, Colo. — Within a week of IBM's announcement of its Model 3420 high-density tape drive, Storage Technology Inc. indicated it too had designed a 6,250 bit/in. tape unit.

The alacrity with which STC made its announcement left some industry observers wondering how STC could be so prompt.

The answer, according to E.T. Ringkjob, director of advanced development at STC, was that STC already had solved many of the technical problems of designing a 3,200 bit/in. subsystem, and had been working on a 6,400 bit/in. unit since learning from "customers and customer prospects that IBM was preannouncing a new IBM high-density (6,400 bit/in.) tape subsystem to them."

In April 1972, STC announced the ST3500/3800 which used densities of 3,200 bit/in. with a data transfer rate of up to 800 kbit/sec.

### 'Modified Development'

During the summer and fall, STC learned of IBM's plans to bring out a 6,400 bit/in. unit, so STC "modified its development objectives of the high-density program from 3,200 bit/in. to 6,400 bit/in.," Ringkjob said.

"When IBM finally announced 6,250 bit/in. on March 7, 1973, STC had solved all the technical problems pertaining to the higher density and was ready to announce its own 6,250 bit/in. subsystem," he said.

Some of the key technical problems which had to be solved, according to Ringkjob, were:

- "The high accelerations and decelerations required with a 0.3 in. gap. To achieve this without using the 'backhitch,' a complete redesign of the capstan system was required using many new components. Redesign of the tape path was also required.

- "The 0.3 in. gap and potential head contamination. This demanded a redesign of the head. Specifically, the read gap to write gap spacing and the head contour were changed.

- "The high number of flux change/in., up to 11,000 flux change/in. This required redesigning all the read and write electronics.

- "High susceptibility to contamination problems. This is because the head-to-tape separation is much more critical with 6,250 bit/in. and required a redesign of the tape cleaning mechanism.

Although STC does not yet have the definition of IBM's 6,250 bit/in. format, "which obviously will become the de facto industry standard," the firm has designed its unit to "allow for fast modification of the format" to conform with IBM's once it becomes known, Ringkjob said.

Some of the steps used to allow for fast future modifications in the format were, according to STC:

- "Using a read-only memory to perform the group translation in the group-coded recording. To change the translation operation only requires replacing the ROM chips.

- "Designing a generalized data flow in the skew buffer and error-correction area. This makes it adaptable to any error-correcting scheme with minor modifications in the control circuitry."

## Honeywell Stockholder Bid To Nominate Thieu Fails

MINNEAPOLIS, Minn. — A resolution calling for Honeywell to get out of some military business and a motion to elect Nguyen Van Thieu, president of South Vietnam, to the board of directors were defeated at the Honeywell annual meeting.

A proxy statement recommending that the board of directors propose an amendment to the bylaws providing that the "company shall not develop or produce antipersonnel weapons, introduced by the national Clergy and Laity Concerned (Calc), was defeated by a vote of 15.6 million votes to 224,795 votes.

Thieu was nominated from the floor at the meeting by Paula Giese of Minneapolis, who said Honeywell had "served Thieu's interests in Southeast Asia and its weapons have helped prop him up."

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## Position Announcements

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POSITION ANNOUNCEMENTS	POSITION ANNOUNCEMENTS	POSITION ANNOUNCEMENTS	POSITION ANNOUNCEMENTS	POSITION ANNOUNCEMENTS
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2150, 2151, 2152, 2153, 2154, 2155,

2156, 2157, 2158, 2159, 2160, 2161,

2162, 2163, 2164, 2165, 2166, 2167,

2168, 2169, 2170, 2171, 2172, 2173,

2174, 2175, 2176, 2177, 2178, 2179,

2180, 2181, 2182, 2183, 2184, 2185,

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2204, 2205, 2206, 2207, 2208, 2209,

2210, 2211, 2212, 2213, 2214, 2215,

2216, 2217, 2218, 2219, 2220, 2221,

2222, 2223, 2224, 2225, 2226, 2227,

2228, 2229, 2230, 2231, 2232, 2233,

2234, 2235, 2236, 2237, 2238, 2239,

2240, 2241, 2242, 2243, 2244, 2

BUY SELL SWAP	BUY SELL SWAP	BUY SELL SWAP	BUY SELL SWAP	BUY SELL SWAP
<b>FOR SALE OR LEASE</b> 024-8300; 024-1300; 085-8250; 077-8550; 082-81000; 083-82000; 085-81800; 407-83000; 402-81300; 403-81500; 407-83000; 814-81300; 819-81800; 548-82300; 863-81500; 857-83700; 862-8400; 2311 (1) 85000; 729 (8) 82500; 729 (8) 83000; 1448 (1) 81000; 1401 systems 817,500 & 836,000. <b>THOMAS COMPUTER CORP.</b> 625 N. Michigan-Suite 500 Chicago, Ill. 60611 (312) 944-1403	<b>IPS has a 360/406</b> with (2) channels available on a month-to-month lease. Need addi- tional capacity now? Call us for im- mediate shipment. <b>IPS</b> Computer Marketing Corp. 487 Sylvan Ave. Englewood Cliffs, N.J. 07632 (201) 871-4200	<b>IBM 360/370</b> <b>BUY...SELL...LEASE</b> <b>CEI</b> CALL <b>AVAILABLE:</b> 360/30 E, F & FE (98K) 360/30 V, 360/30 1334, 19832; 360/30 M or I Systems 3312 AI Disc, 3311's 2401 Term, 2, 3, 4, 5 2804-2 Controller 17 & 9 360/30 IBM 38K Core EBF & IIFE (80K) 370/45, 188, 188 CPU's  <b>COMPUTER EXCHANGE</b>	<b>Current Inventory</b> <b>SALE</b> All this Unit Record Equipment in stock and ready to ship at money sav- ing sale or lease prices. <b>RARELY OFFERED 046,</b> 029, 056, 407, A3, 548, 557, 067, 008 <b>OTHER FINE MODELS.</b> 024, 026, 056, 077, 085, 082, 403, 407, 514, 519, 523, 552, 602, 604, 521, 826 <b>D.P. Equipment</b> <b>Marketing Corp.</b> 260 W. Broadway, N.Y. N.Y. (212) 925 7737 Ext. 1	<b>WANTED</b> <b>NCR 395, 400</b> <b>BURROUGHS</b> <b>L2000 to L5000</b> <b>I.O.A. Data Corp.</b>
<b>CDC 3300 81K Master System</b> <b>For sale or lease</b> Wanted: IBM 370's. Will purchase 370 systems for resale or lease-back. <b>Computer Systems</b> <b>of America, Inc.</b> 79 Milk Street, Boston, MA 02109 (617) 482-4671	<b>Before you Buy—Lease—Sell</b> <b>360-370</b> CPU-TAPE DRIVES, DISK DRIVES, CORE-1/2M Call collect or write -MICHIGAN-  <b>THE LARGEST DEALER IN THE WORLD SPECIALIZING</b> <b>IN MARKETING PRE OWNED IBM EQUIPMENT</b>	<b>SACRIFICE</b> <b>NO REASONABLE OFFER</b> <b>REJECTED.</b> 2 IBM Type 082 Card Sorters, also 083 and 084 IBM Type 548 and 552 Interpreters IBM Type 085, 087 and 088 Col- lectors, also 077 Alpha, 3 IBM Type 075 Key Punches 2 IBM Type 046 Tape to Card Ma- chines IBM Type 059 Ventilators, Model 2, also 056 IBM Tab Accounting Machine Type 407, 403 and 402 IBM Type 519 Document Originating Machine with 27 position Mark Sense, as well as IBM Type 514 Re- producing Punch, NCR Computer Type 395 with 120 Totals, NCR Sorter and Key Punch with 2 Model 395, Complete System Phone Collect, Area Code (313) 584-9787 <b>MICHIGAN SYSTEMS</b> <b>RESEARCH COMPANY</b> 8801 Schaefer Dearborn, Michigan 48128	<b>WANTED</b> to purchase <b>Honeywell</b> <b>Series 200</b> H-115, 120, 200, etc. 24-32K 2 disk, 3 tape, printer, card ALSO 2314 or equiv. indep. disk drives. Reply stating price & specs. P.O. Box 4048 Portland, Oregon 97208	<b>WANTED</b> <b>ALL 360 SYSTEMS</b>  <b>CORPORATE</b> <b>COMPUTERS, INC.</b> 420 Lexington Avenue, New York, N.Y. 10017 (212) 532-1200
<b>360/25</b> <b>1130</b> 360/25 (16K) with 1401 Com- patibility, 2540, 1403-N1, 2415 available immediately for sale or lease. Excellent replacement for 1401 or 360/25 on rental.	<b>360/25 (16K) with 1401 Com-</b> <b>patibility, 2540, 1403-N1, 2415</b> <b>available immediately for sale or</b> <b>lease. Excellent replacement for</b> <b>1401 or 360/25 on rental.</b>	<b>LEASE BUY SELL</b> <b>360</b> <b>computer wholesale corp.</b> (312) 581-7741	<b>LEASE BUY SELL</b> <b>370 360</b> <b>LEASE PLANS PRE-OWNED</b> <b>3 YEARS &amp; LONGER EQUIPMENT</b> <b>LOWEST RATES</b> <b>THOMAS COMPUTER CORPORATION</b> 625 N. Michigan Ave. Chicago, Illinois (312) 944-1401	<b>FOR SALE</b> <b>360/40</b> IBM 360/40 with 729's and 1401's <b>Comdisco Inc.</b>
<b>BUY SELL LEASE TRADE</b> <b>360 ... 370</b> CPU ... CORE ... I/O TAPE/DISC DRIVES CALL (612) 346-4422 <b>DATASRV</b> <b>EQUIPMENT</b> 400 Sheldahl Plaza, MPLS. MN. 55426	<b>We Need:</b> 1419 MOD 1 2311 MOD 1 2415 MOD IV 360/65 <b>BUY SELL LEASE</b> <b>FOR BETTER VALUE LOOK TO:</b> <b>Available:</b> 360/40-129K 360/40-196K 1403 MOD 111 2821 MOD V	<b>FOR SALE OR LEASE</b> 360/20/30/40 CPU's & Systems 1401, 1440, 1820, 2311, 2841, Univac 9200 System All Types Unit Record <b>LEASE OR LEASE PURCHASE</b> Two 1401-16K with 729's One 1401-12K with 729's <b>CALL or WRITE</b> Data Automation Services, Inc. 4538 Cash Road Dallas, Texas 75247 (800) 527-6148 318 W. 28th Street Los Angeles, Calif. 90007 (213) 747-0587 7750 N.W. 7th Avenue Miami, Fla. 33150 (305) 693-3911	<b>Fairfield Memory</b> will buy 135, 145, 155, 165. Mod. 30, 40, 50, 65 CPU's. <b>Fairfield Memory</b> will lease long-term 145. <b>Fairfield Memory</b> will sell its own core for 30, 40, 44, 50, 65, 67, 75. (714) 557-9873 <b>Fairfield Memory</b> 1792 Kaiser Drive Irvine, Calif. 92664	
<b>cac</b> <b>COMPUTER ACQUISITIONS COMPANY</b> P O BOX 80572 ATLANTA GA 30341 • (404) 458-4425 <b>BEFORE YOU BUY</b>  <b>BEFORE YOU SELL</b> <b>GO GREYHOUND</b> <b>PHONE:</b> (802) 248-8872 <b>WRITE:</b> Manager of Resale Equipment Greyhound Computer Corporation Greyhound Tower Pleasant, Arizona 88677	<b>WANTED</b> 360/65's 360/50's 360/30's 2314 <b>FOR SALE</b> 2046's 1401's 3237, 4427, 5980, 6981, 7320, 7920, 1082-9 2314's	<b>FOR SALE</b> 360/20/30/40 CPU's & Systems 1401, 1440, 1820, 2311, 2841, Univac 9200 System All Types Unit Record <b>LEASE OR LEASE PURCHASE</b> Two 1401-16K with 729's One 1401-12K with 729's <b>CALL or WRITE</b> Data Automation Services, Inc. 4538 Cash Road Dallas, Texas 75247 (800) 527-6148 318 W. 28th Street Los Angeles, Calif. 90007 (213) 747-0587 7750 N.W. 7th Avenue Miami, Fla. 33150 (305) 693-3911	<b>FOR SALE</b> <b>360/40</b> IBM 360/40 with 729's and 1401's <b>Comdisco Inc.</b>	

# CIS



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File Adapter  
From 370/135  
Levin Computer Corp.  
(213) 653-6344



## DEC Third Quarter Earnings Rise 68%

MAYNARD, Mass. — Digital Equipment Corp. managed a 68% increase in earnings on a 41% rise in revenues during the third quarter ended March 31.

Demand was good across the board for small, medium- and large-scale systems, DEC said.

In the quarter, earnings reached \$6.2 million or 56 cents

a share compared with \$3.7 million or 36 cents a share in the year-ago period.

Revenues rose to \$67.4 million from \$47.7 million in the same 1972 quarter.

### Nine Months

For the nine months, earnings totaled \$14.2 million or \$1.31 a share compared with \$10.2 million or \$1 a share in the comparable 1972 period.

Revenues were \$179.2 million, up from \$131.1 million in the 1972 period.

The 1973 earnings figures include about 5 cents a share attributable to currency revaluations, DEC said.

The firm has expanded its work force, principally in the manufacturing and field service segments, and employment at the end of the quarter reached about 11,800 people, the firm said.

## Beehive Posts Earnings Gain in Six Months

SALT LAKE CITY, Utah — Record quarterly revenues sparked continuing increases in earnings for Beehive Medical Electronics, Inc.

In the six months period ended March 31, Beehive earned \$204,314 or 22 cents a share compared with \$24,302 or 3 cents a share in the year-ago period. Of the total per-share earnings for the half year, a record 12 cents a share was generated in the second quarter alone, according to President Warren B. Clifford.

Revenues totaled \$1.5 million, up 92% from \$789,550 for the same period last year.

This represents the sixth straight profitable quarter for the company and a continuance of an upward earnings trend following the first full profitable year in fiscal 1972, Clifford said. Backlog as of March 31 totaled about \$3.7 million, he added.

## Tally Reports First Quarter Loss; Bank Extends Credit Line One Month

KENT, Wash. — Tally Corp. gained one month in which to search out a new source of short-term credit, when the National Bank of Commerce, Seattle, extended to May 31 its termination date of short-term credit to the peripherals manufacturer.

Tally President James E. Navarre told stockholders at the annual meeting that the firm's ability to continue operations depends on obtaining additional financing.

The firm sustained a loss in the first quarter ended April 1 of \$335,175 compared with a loss of \$222,022 in the same quarter a year ago.

Revenues rose to \$3.1 million

from \$2.8 million in the same 1972 quarter.

Navarre said he expects Tally will be profitable in the second quarter if "it receives no significant customer cancellations resulting from the adverse announcement about financing; if it incurs no major work stoppages through the failure of vendors to supply parts; if it is not required to reduce personnel; and if it obtains additional financing in the near future."

Tally has intensified efforts to reduce operating expenses by lowering overhead levels, consolidating certain operations and selling a money-losing subsidiary, he said.

Tally recently sold its EDP Division to Standard Logic Inc. The division manufactures disk memory units.

## Nickels & Dimes

Data 100 has completed the first portion of a financing involving the private sale of 10-year 8% subordinated convertible debentures, which amounted to \$7.9 million. The second portion is expected to amount to \$2- to \$3-million, the company said. The financing will enable the firm to extend its bank lines of credit and eliminate a public financing that had been scheduled for later in 1973, a spokesman noted.

### \$\$\$

In April TEC paid its first semi-annual dividend, which is in addition to the firm's 10 consecutive annual dividends.

### \$\$\$

Foxboro President Earle W. Pitt told shareholders he sees shipments becoming increasingly heavy in the second quarter and half, which would support his earlier forecast of \$165 million in sales.

### \$\$\$

Applied Data Research had its second consecutive quarter in which sales topped \$1 million.

### \$\$\$

Name game: Terminal Equipment is now Tycom. Signetics Memory Systems, subsidiary of Corning Glass Works, now calls itself Scientific Micro Systems. It recently sold its semiconductor plant to Signetics, another Corning subsidiary, and will concentrate on the application of microelectronics to end user products.

# 6250 bpi tape subsystems dual speed/dual density



The STC 3600/3800 Series  
High Density Tape Subsystems

model	speed (ips)	density (bpi)
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3675	200/100	1600/6250
3670	200	1600/6250
3650	125	1600/6250
3640	100	1600/6250
3630	75	1600/6250

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dual speed/dual density  
multitrack error correction  
increased throughput  
1973 delivery

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UNDER IBM MAINTENANCE

Qty.	Model/Feature	Description
5	3420 7	Mag. Tape Unit
2	3631	Single Density
2	3420 7	Mag. Tape Unit
1	3650	Dual Density
1	3603 1	Tape Control
	3651	Dual Density

**NVC** COMPUTER SALES, INC.  
Suite 818, Benjamin Fox Pavilion  
Jenkintown, Pa. 19046 • (215)-887-5404



# Computerworld Stock Trading Summary

All statistics  
compiled, computed  
and formatted by  
TRADE & QUOTES, INC.  
Cambridge, Mass 02138

CLOSING PRICES THURSDAY MAY 10, 1973

E A C H	1973 RANGE 11/1	PRICE CLOSING MAY 10 1973				1972 CLOSING MAY 10 1972	HIGHER PERCENT CHANGE	1973 CLOSING MAY 10 1973	HIGHER PERCENT CHANGE
		1973 RANGE 11/1	1973 CLOSING MAY 10 1973	1973 CLOSING MAY 10 1973	1973 CLOSING MAY 10 1973	1972 CLOSING MAY 10 1972	1972 HIGHER PERCENT CHANGE	1973 CLOSING MAY 10 1973	1973 HIGHER PERCENT CHANGE
SOFTWARE & EDP SERVICES									
O ADVANCED COMP TECH	1-2	1 1/4	-	1/4	-16.6				
A APPLIED DATA MSA	4	2 3/4	-	1/4	-6.3				
O APPLIED LOGIC	2-3	1 5/8	-	1/8	-7.1				
N AUTOMATIC DATA	65-66	73 3/4	-	7/8	-1.1				
O BRANSON APPLIED SYS	1-1	5/8	0	0	0.0				
O COMPUTER DIMENSIONS	2-5	1 1/4	-	1/4	-5.5				
O COMPUTER DYNAMICS	1-2	5/8	0	0	0.0				
O COMPUTER NETWORK	2-5	1 1/2	0	0	0.0				
N COMPUTER SCIENCES	2-6	3 1/8	-	3/8	-10.7				
O COMPUTER TASK GROUP	1-2	1 3/8	-	3/8	-37.5				
O COMPUTER TECHNOLOGY	2-3	1 3/4	-	1/4	-6.3				
O COMPUTER USAGE	5-9	5 3/4	0	0	0.0				
O COMMISS	1-2	1 1/4	-	1/4	-33.3				
O COMSHEAR	6-9	5 3/8	-	1/8	-2.2				
N CONDURA CORP	6-14	7 3/4	-	3/4	-5.0				
O DATATAB	3-4	2 1/4	0	0	0.0				
O END RESOURCES	1-2	1 1/4	-	1/4	-6.3				
A ELECT COM PHOG	1-2	1 1/4	0	0	0.0				
N ELECTRONIC DATA SYS	35-36	39 1/8	-	1/8	-5.0				
O ENFORMATICS	2-4	2 3/4	-	1/4	-6.3				
D I.O.A. DATA CORP	1-1	3/4	0	0	0.0				
O KEANE ASSOCIATES	3-4	3	0	0	0.0				
O KEYVOTAC CORP	7-12	6 3/4	-	1/8	-3.0				
O LOGISCOM	4	3 1/4	-	1/4	-6.3				
A MANAGEMENT DATA	2-5	2	0	0	0.0				
O NATIONAL CES INC	6-11	22 1/4	-	1/4	-2.3				
O NATIONAL INFO SVCS	1-2	1 1/8	0	0	0.0				
ON LINE SYSTEMS INC	13-17	14 3/4	-	1/4	-15.6				
N PLANNING RESEARCH	3-7	3 1/2	-	1/4	-6.6				
O PROGRAMMING METHODS	22-24	24 1/4	-	1/4	-5.6				
O PROGRAMMERS & SYS	1-1	7/8	0	0	0.0				
O HARVIDATA INC	13-16	12 3/4	-	1/4	-1.9				
O SCIENTIFIC COMPUTERS	1-2	1	0	0	0.0				
O SIMPLICITY COMPUTER	2-4	3 1/2	-	3/8	-10.0				
O THE COMPUTER CENTERS	3-4	2 1/4	-	1/4	-4.3				
O TCC INC	1-1	1 1/2	0	0	0.0				
O TRENHARN INC	7-12	7 1/8	-	5/8	-6.8				
O UNITED DATA CENTER	5-6	1 1/4	-	1/4	-9.5				
O UNIVISYS COMPUTING	6-11	1 1/4	-	1/4	-15.0				
A UHS SYSTEMS	4-8	4 3/4	-	1/4	-2.7				
PERIPHERALS & SUBSYSTEMS									
N ADWIDE5500H/MULT	16-26	16 1/4	-	1/4	-12.2				
O ADVANCED MEMORY SYS	8-23	8 1/4	-	5/8	-37.7				
N AMPEX CORP	4-10	7 1/2	-	1/4	-5.2				
O ANDERSON JACOBSON	4-6	4 1/4	-	1/4	-15.0				
O RELIEVE MEDICAL ELEC	6-10	7 1/2	-	1/2	-11.7				
O INTERPERF & NEW	12-12	12 1/4	-	1/4	-6.3				
N MUNHLEHMAN	6-18	14 5/8	-	7/8	-6.3				
A CALCOMP	9-13	4	-	1/2	-5.2				
O CARDHOUSE MEMORIES	10-15	11	-	1 1/2	-15.7				
O CATHODIC DATA INC	10-26	22 1/4	-	1/4	-6.3				
O CODEX CORP	11-19	13	-	1 1/2	-13.0				
O COUNTECHNICS	1-3	0	0	0	0.0				
N CRANFORD DATA SCI	6-11	7 1/8	-	1/8	-0.9				
A COMPUTER EQUIPMENT	2-3	2 1/8	-	3/8	-15.0				
O COMPUTER MACHINERY	8-13	8 1/4	0	0	0.0				
O COMPUTER TRANSCIVER	3-4	1 1/4	-	1/4	-6.3				
A COMQUEST	3-4	4 7/8	-	1/8	-2.2				
N CONRAC CORP	10-12	10 7/8	-	3/8	-1.9				
O DATA PRODUCTS COMP	2-3	2 3/4	-	1/4	-6.3				
O DATA RECOGNITION	2-3	3 1/2	0	0	0.0				
O DATA TECHNOLOGY	2-5	2 5/8	-	1/8	-5.9				
O DIJAN CONTROLS	2-4	2 3/4	0	0	0.0				
N ELECTRONIC M & N	3-5	3	-	1/4	-7.7				
O FARRITE CORP	3-5	3	-	1/4	-7.7				
O GENERAL COMPUTER SYS	5-9	5 3/4	-	1/4	-6.3				
N GENERAL ELECTRIC	50-76	61	-	7/8	-1.4				
N HAZELTONE CORP	7-9	7 1/8	-	1/8	-1.7				
O INFOTEL INC	12-18	12 1/2	-	1/4	-1.9				
O INFORMATION DISPLAYS	1-2	3 1/4	-	1/4	-25.0				
O INFORMATION INTEL INC	11-15	11	-	1/4	-6.0				
A LUNDY ELECTRONICS	4-9	4 7/8	-	1/8	-2.6				
O MANAGEMENT ASSIST	1-1	3/4	0	0	0.0				
A MILDG ELECTRONICS	17-28	19 3/4	-	1	-5.3				
O MINORAK DATA SCI	3-4	3 1/4	-	1/4	-6.3				
O OEC COMPUTER SYST.	3-6	3 1/4	0	0	0.0				
O OPTICAL SCANNING	2-7	3 3/4	-	1/4	-7.1				
O PENTEC CORP	2-7	6 3/4	-	1 1/2	-28.5				
O PROTON	4-7	3 3/4	-	1/4	-6.3				
A PROTIN INSTRUMENT	4-9	4 1/2	-	1/2	-10.0				
O PRECISION INST.	4-9	4 1/2	0	0	0.0				
O RECONITION EQUIP	4-9	5 1/4	-	1/4	-6.3				
N SANDERS ASSOCIATES	8-14	8 5/8	-	1/8	-1.4				
O SCAN DATA	4-6	2	-	1/4	-5.0				
O STORAGE TECHNOLOGY	17-34	17	-	1 1/2	-12.8				
A SYCOR INC	1-13	13 1/2	-	1 3/4	-14.3				
O TALLY CORP	3-14	3 1/2	-	1/4	-6.6				
N TETHRONIX INC	34-53	36 3/4	-	1/4	-6.3				
N TELER	4-6	3 3/4	-	1/4	-3.2				
O WILTER INC	13-14	11 3/4	-	1/4	-2.0				
SUPPLIES & ACCESSORIES									
O BALTIMORE BUS FORMS	5-9	9 6 3/4	-	3/2	-6.8				
A BARRY WRIGHT	10-13	8	-	3/2	-3.0				
O BATA DOCUMENTS	18-22	20 3/4	-	3/2	-6.3				
O DUPLEX PRODUCTS INC	6-9	7 3/4	0	0	0.0				
N EMERSON FORMS	6-9	6	-	3/2	-6.3				
O GRAHAM MAGNETICS	13-20	18 3/4	-	1 1/8	-6.9				
O GRAPHIC CONTROLS	10-12	10 3/4	-	7/8	-6.8				

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## Earnings Reports

COMDISCO	
Three Months Ended Dec 31	1972
Shr Earnings	\$2.26
Revenue	5,286,079
Earnings	285,011

ELECTRONIC MEMORIES & MAGNETICS	
Three Months Ended March 31	1972
Shr Earnings	\$2.27
Revenue	24,743,000
Earnings	1,488,058
3 Mo Shr	43
Revenue	23,985
Earnings	48,119

NATIONAL C&S	
Year Ended Feb 28	1972
Shr Earnings	\$1.37
Revenue	18,859,057
Earnings	707,000
3 Mo Shr	43
Revenue	23,985
Earnings	48,119

WANG LABORATORIES	
Three Months Ended March 31	1972
Shr Earnings	\$2.26
Revenue	12,915,741
Earnings	1,024,571
3 Mo Shr	43
Revenue	23,985
Earnings	48,119

DATA CONTROL SYSTEMS	
Three Months Ended Dec 29	1972
Shr Earnings	\$1.37
Revenue	81,300,000
Earnings	1,024,571
3 Mo Shr	43
Revenue	23,985
Earnings	48,119

DATA GENERAL	
Three Months Ended March 17	1972
Shr Earnings	\$1.37
Revenue	11,600,000
Earnings	1,024,571
3 Mo Shr	43
Revenue	23,985
Earnings	48,119

MICRODATA	
Three Months Ended Feb 28	1972
Shr Earnings	\$1.37
Revenue	1,251,028
Earnings	1,024,571
3 Mo Shr	43
Revenue	23,985
Earnings	48,119

INTEL	
Three Months Ended Jan 31	1972
Shr Earnings	\$1.37
Revenue	9,507,000
Earnings	1,024,571
3 Mo Shr	43
Revenue	23,985
Earnings	48,119

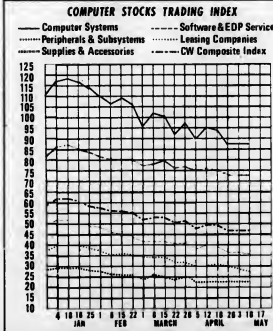
SYCDR	
Year Ended Dec 31	1972
Shr Earnings	\$1.37
Revenue	15,050,078
Earnings	1,024,571
3 Mo Shr	43
Revenue	23,985
Earnings	48,119

DPA	
Three Months Ended Feb 28	1972
Shr Earnings	\$1.37
Revenue	10,064,000
Earnings	1,024,571
3 Mo Shr	43
Revenue	23,985
Earnings	48,119

APECO	
Three Months Ended Feb 28	1972
Shr Earnings	\$1.37
Revenue	30,984,000
Earnings	1,024,571
3 Mo Shr	43
Revenue	23,985
Earnings	48,119

MDHAWK DATA SCIENCES	
Nine Months Ended Jan 31	1972
Shr Earnings	\$1.37
Revenue	3104,415,000
Earnings	1,024,571
3 Mo Shr	43
Revenue	23,985
Earnings	48,119

NICOLET INSTRUMENT	
Year Ended March 30	1972
Shr Earnings	\$1.37
Revenue	5,700,000
Earnings	1,024,571
3 Mo Shr	43
Revenue	23,985
Earnings	48,119



# FOR \$26,123 A MONTH, IBM WILL RENT YOU THIS:



# FOR \$25,022 A MONTH, ITEL WILL LEASE YOU THIS:



The big difference between IBM and ITEL shows up on your financial statement.

As an example, for \$26,123 a month, IBM rents you a System/370 Central Processing Unit alone, but for \$25,022, ITEL will give you the 370 CPU plus one megabyte of AMS Monolithic Memory, 8 ITEL disk drives plus controller, as well as 8 ITEL tape drives and one controller.

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And that's only one example. We'll lease any kind of computer package (360 or 370) on 3- to 8-year terms at proportional savings. Which explains why we have \$300 million of IBM computer equip-

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